PEST CONTROL

MARCH
1956

CDC Report For 1956 On the Use of Pesticides of Public Health Importance Pg. 9

PCOs at Purdue Meeting Warned New Talents May Be Required for Grain Sanitation . . . Pg. 30

"Deferred" Pest Control Payment Plan Suggested At Southern Meet Pg. 40

Invasion of Resistant Roach Today's Biggest Problem in Northeast, Eastern Delegates Are Told . . . . . Pg 46

Oklahoma PCO Meet Has Business and Technical Program . . . . Pg. 50

Can Termite Proofing Injure Shade Trees and Shrubs? . . . . Pg. 51

Laboratory workers at the CDC's Oxford Island, Ga., Technical Development headquarters use Geiger counter to monitor mosquitoes for radioactive specimens, as part of saltmarsh mosquito dispersion study. Mosquito larvae are treated with radioactive phosphorus and then released. At intervals thereafter, adult mosquitoes are trapped and checked to see if they belong to the treated group, thus showing range of activity. Complete CDC 56 pesticides report begins page 9.

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John J. O'Connor

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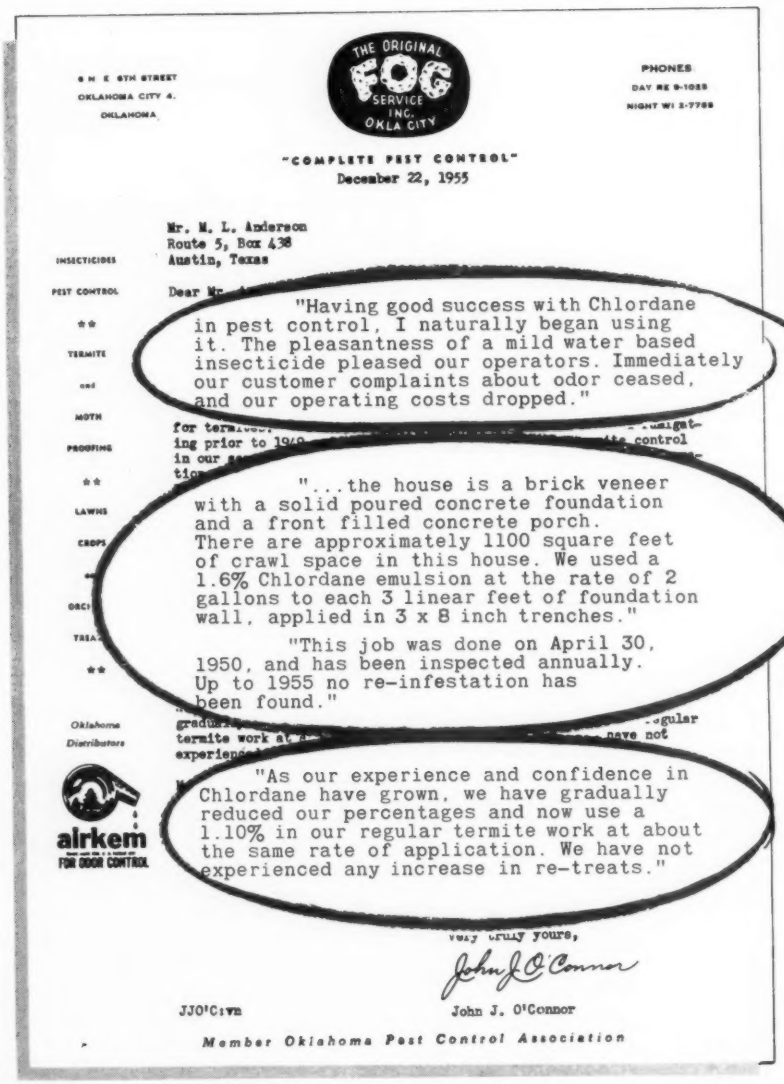

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December 22, 1955

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LAWNS
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"...the house is a brick veneer with a solid poured concrete foundation and a front filled concrete porch. There are approximately 1100 square feet of crawl space in this house. We used a 1.6% Chlordane emulsion at the rate of 2 gallons to each 3 linear feet of foundation wall, applied in 3 x 8 inch trenches."

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"As our experience and confidence in Chlordane have grown, we have gradually reduced our percentages and now use a 1.10% in our regular termite work at about the same rate of application. We have not experienced any increase in re-treats."

Very truly yours,
John J. O'Connor

JJO'C:vm

John J. O'Connor

Member Oklahoma Pest Control Association

In 1950 he began using Chlordane for termite control.

John O'Connor describes his first termite proofing experience with Chlordane...

Mr. O'Connor is one of many PCO's across the country who give homeowners the most for their termite control money by using Chlordane. He knows from experience that proven Chlordane gives long residual protection. PCO's like John O'Connor know that reputation depends on effective control...that's why he uses Chlordane.

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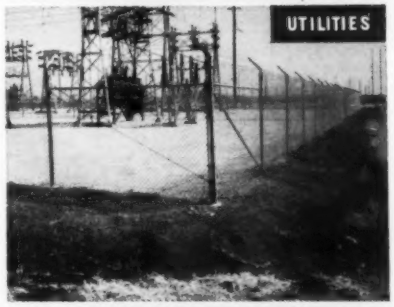
Du Pont is telling industry about "Telvar" and suggesting the services of custom sprayers to apply it through advertisements in industrial and business publications.

To help you build weed-control business, Du Pont has available new and colorful sales aids. For more information, write the District Office nearest you listed below.

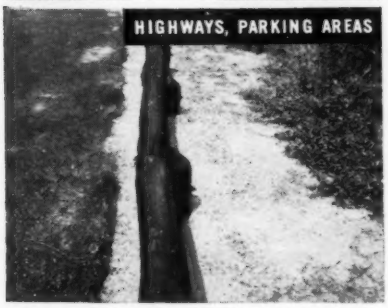
Oilmen know the value of weed control to reduce fire hazards around tanks, refineries and pipelines. "Telvar" weed killers give the economical long-term control they like.

There are many opportunities for weed-control service in industrial plants. Just one application of a "Telvar" weed killer kept this area free of vegetation for more than a year.

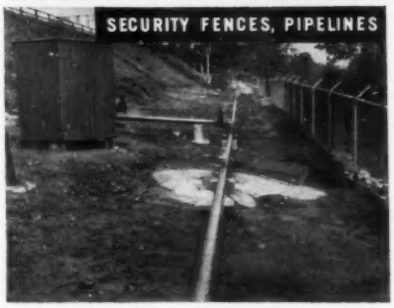
Storage areas usually have heavy weed growth. This illustration shows the kind of thorough control you can offer with "Telvar" weed killers.



Utilities use weed-control service for their various installations. A "Telvar" weed killer was applied just once around this substation. The treated area is still bare—6 months later.



Chemical control is rapidly replacing costly hand maintenance in highway and parking areas. One application of a "Telvar" weed killer brought this result.



Where there are security fences and pipelines, there are weeds to control. Treated with a "Telvar" weed killer over two years ago, this area looks like this today.

On all chemicals, follow label instructions and warnings carefully.

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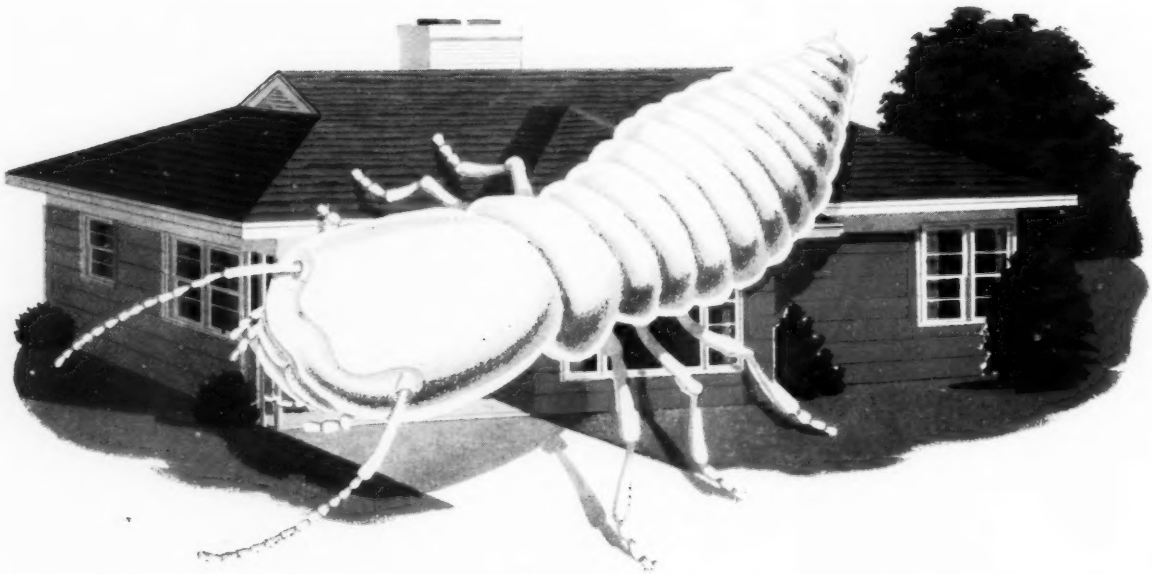

Now dieldrin, approved and recommended for termite control, is proving to be one of the most effective and long-lasting chemical controls for termites. Tests indicate that dieldrin's remarkably long residual action can keep knocking out termites for years and years.

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Next time your customers call on you for termite control, use longer-lasting, more-effective dieldrin. It is manufactured by leading formulators under their brand names. Technical information on dieldrin and its application is available. For further details, write to:

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SHELL

Legislation Controversy

Like it or not, legislation to certify and license PCOs will sooner or later regulate pest control operations in every one of those states where this business plays a significant role in community sanitation and property protection. Yet, as an industry, no combined action is being taken to write a recommended uniform law, or to establish guiding principles that will protect PCOs from the ill-conceived bills and lack of enforcement which beset operators in some of the 13 states now with pest control legislation.

In the news section of this issue you will find a report of what appears to be very lax enforcement of the pest control law under which Louisiana PCOs operate. In previous issues we have told of pitfalls in legislation which does not provide for an industry hearing on proposed changes. Yet, new bills are being written, apparently with PCO approval, without this provision.

Whenever the subject of legislation comes up, there never seem to be any middle-of-the-roaders. You're either strongly for it, or vehemently against it. Some even delight in just watching the controversy rage.

A matter as important as this one that affects every PCO, requires calm, cool heads seriously hunting for a sensible answer. The old adage, "If you can't lick 'em, join 'em," looks like pretty wise advice.

Let's get the best industry thinking working with officials of federal agencies to prepare sound regulatory standards for pest control operations. The effectiveness of such teamwork is demonstrated in the industry's cooperation with the Federal Housing Administration and the Building Research Advisory Board to develop standards for termite soil poisoning. Wouldn't a similar investigation with members of the U. S. Department of Agriculture and the Public Health Service help resolve this legislative dilemma?

That this technique can be used with success to avoid a legislative mess involving 48 different sets of regulations has been shown by action of the Chemical Specialties Manufacturers Association which, with the aid of legal counsel, established uniform pesticide registration regulations now followed by most states considering legislation to control the sale of insecticides and rodenticides.

Because PCO legislation appears to be inevitable, we hope preconceived prejudices can be put aside and an earnest effort made to resolve a considered legislative blueprint that is fair to both the public and to pest control operators. If this is not done soon, the time and money wasted attempting to correct inept bills will be magnified by the number of states yet to license PCOs.

PEST CONTROL

EVERY MONTH SINCE 1933

JAMES A. NELSON, Editor — H. B. WILSON, Associate Editor

THEODORE RIEDEBURG, East Coast Representative — R. J. HOFFER, Circulation Manager — KARL HASSLER, West Coast Representative

Volume 24 **MARCH 1956** **No. 3**

In This Issue:

1956 Report from the Communicable Disease Center Public Health Pesticides for Mosquitoes, Flies Fleas, Roaches, Bed Bugs and Rodents ... 9

20th Purdue Conference Updates PCOs for Their Role in Grain Sanitation With Warning New Talents May Be Required ... 30

"Buy Now, Pay Later" Pest Control Suggested To 125 Dixie Operators Attending '56 Southern Conference ... 40

Spread of Resistant German Roach Most Important Problem Facing Northeast PCOs Spear Tells 153 at Eastern Conference ... 46

Combined Business, Technical Program Draws 86 to Oklahoma PCO Conference ... 50

Termite Proofing Injuries To Shade Trees and Shrubs By Dr. Spencer H. Davis, Jr. ... 51

Poll Reveals PCOs Expanding Into Weed Control and Custom Spraying ... 54

Unusual Invaders Notebook by Prof. J. J. Davis ... 64

Look Alikes: 15, American Dog Tick and Brown Dog Tick Primer by Dr. Marion E. Smith and Hsiu-fu Chao ... 66

Letters ... 6
News ... 58
Calendar ... 60
Book Reviews ... 64
Infestation Report ... 67
Classifieds ... 68
Advertisers ... 68
Pestales ... 70

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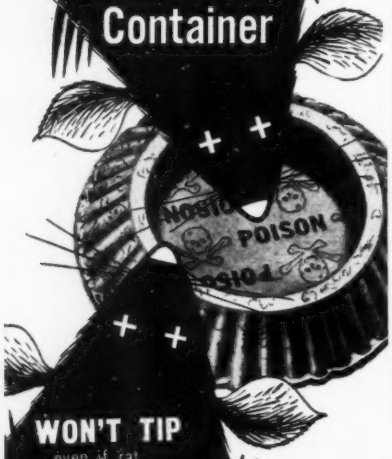

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Letters

Safety With Electricity

Referring to your January Safety Issue, we feel that the danger confronting operators who use portable electric hand tools is the most serious and far reaching exposure this industry faces today.

We also feel that, next to electrical hazards, the exposure from the use of toxic or lethal gases is our greatest concern. This of course, includes the subject of proper and safe procedures in operation, proper respiratory equipment, protective clothing and approved resuscitory equipment. We believe safety information on this subject would be most valuable to those in the pest control industry.

Of course, the hazards encountered in transportation cannot be overlooked, but all industries face this problem.

Walter B. Clark

Safety Director
Orkin Exterminating Co.
Atlanta, Ga.

Rodent Article Ideas

Here are some ideas for future articles on rodent control:

A study might be made on rodent acceptability of liquids along the lines of Dr. Harlan Schuyler's research on solid baits at Purdue University.

Another interesting article would be a listing of unusual rat problems of a dozen or so PCOs invited to submit them.

Finally it would be interesting to see proved or disproved the current theory that recommended dosages of anticoagulants for Norway rats are excessive.

Kenneth N. Cook

Ransford Pest Control
Worcester, Mass.

Pest Control welcomes expressions of opinions from its readers. Send ideas and comments as briefly as possible to James A. Nelson, Editor, Pest Control, 1900 Euclid Avenue, Cleveland 15, Ohio.

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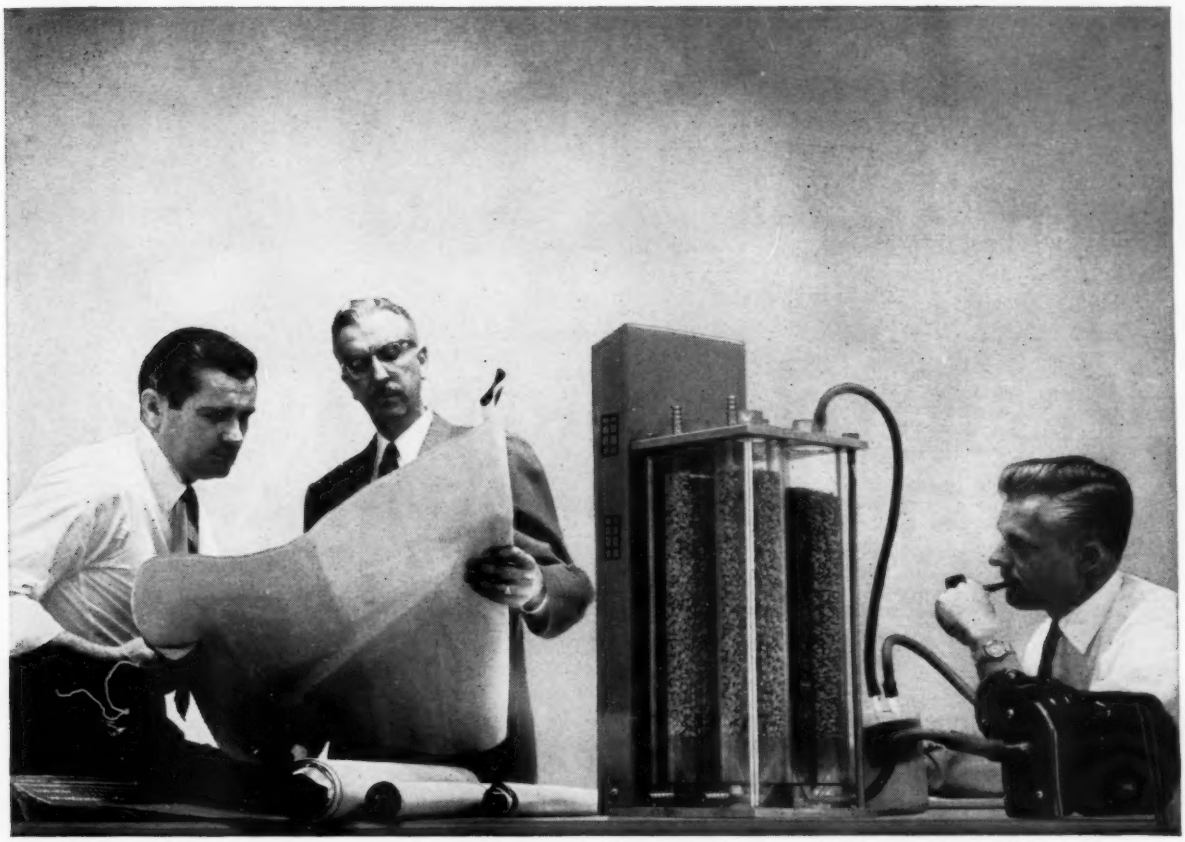

Scale model demonstrates how new method eliminates guesswork . . . lowers cost.

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Sign at entrance to CDC Oatland Island lab.

1956 REPORT from the Communicable Disease Center

Headquarters for CDC Technology Branch.

PUBLIC HEALTH PESTICIDES[1]

For Mosquitoes, Flies, Fleas, Roaches, Bed Bugs and Rodents

From the Communicable Disease Center, Public Health Service, U. S. Department of Health, Education and Welfare, Savannah, Georgia

THIS SUMMARY of current information on the chemical control of pests of public health importance is based on investigations conducted by the Technology Branch, Communicable Disease Center, supplemented by data from the literature and from unpublished material provided by other research organizations.[2] As with previous resumes, this summary of technologic information stresses those pesticides which, under test or field conditions, have provided the highest level of control at dosages which are compatible with human safety. Such a summation precludes the consideration of all chemicals capable of exerting suppressive effects upon the pests discussed. In addition, experimental data on pesticides that, as yet, are unavailable for public usage have been omitted. Information on such compounds may be obtained by writing to the Technical Development Laboratories, Communicable Disease Center, Box 769, Savannah, Georgia. In the current review, control measures which remained unchanged from those recommended in 1955 are restated verbatim.

In this resume, chemical control measures are discussed as they relate to groups of arthropods or rodents. In companion releases from the Communicable Disease Center, the individual pesticide is discussed in its relation to the control of insects of public health importance and to its toxicological status. These releases, "Clinical Memoranda on Economic Poisons," and "Operational Memoranda on Economic Poisons" may be obtained by contacting the Communicable Disease Center at the address previously stated.

In utilizing any of the measures outlined herein, it is important that the limitation of the individual treatment be recognized. The general tendency to use a single method to cope with a pest in a variety of situations frequently leads to disappointing and ineffective results. Most studies of control measures relate to specific geographic areas involving certain climatic characteristics and possible physiological differences in the strain of the arthropod concerned and in its behavior. Thus, certain of the data reported herein may require adaptation to local conditions. It follows that successful control operations are contingent largely upon the skill and ingenuity of the individual in the selection and application of the control tools available to him.

MOSQUITO CONTROL

Physiological resistance to DDT has been demonstrated in *Anopheles sundaicus* (Indonesia) and in *A. sacharovi* (Greece) and reports suggest a loss of susceptibility to this pesticide in five other anopheline species in Africa, Europe, and South America. In the United States, the principal malaria vector, *A. quadrimaculatus*, continues to be susceptible to DDT. However, recent studies show that in Bolivar County, Mississippi, this species has a high level of resistance to dieldrin, BHC, and chlordane residues. Dosages of dieldrin as high as 200 mg. of toxicant per square foot produced only a 5 per cent mortality following 30-minute exposures of adults of this strain. Against DDT residues no loss in susceptibility was noted. Presumably the resistance of *A. quadrimaculatus* to these pesticides resulted from the extensive agricultural use of these or related chemicals in that area. In view of the continued effectiveness of DDT against adult *A. quadrimaculatus*, control procedures for this species remain the same: the use of a 5 per cent DDT-emulsion for the residual treatment of dwellings or a 5 per cent DDT-oil solution for outdoor space treatments. In

1. From the Communicable Disease Center, Public Health Service, U. S. Department of Health, Education, and Welfare, Savannah, Georgia, February 1, 1956.
2. Particular acknowledgment is made to the Entomology Research Branch, U. S. Department of Agriculture, and to the California Department of Public Health, Bureau of Vector Control, for providing certain unpublished experimental data for inclusion in this resume.

CDC field worker adds radioactive phosphorus to trays of saltmarsh mosquito larvae for dispersion studies.

countries where the anopheline vectors no longer are controlled by DDT deposits, a 1.25 per cent dieldrin suspension or emulsion can be employed.

Current data on the development of resistance in flies and mosquitoes indicate that the exposure of both larval and adult stages to chlorinated hydrocarbon insecticides may cause a more rapid development of resistance than does the exposure of a single stage. Consequently, larviciding for the control of *A. quadrimaculatus* should not be carried out except where this method is the only practicable means of abatement. When such treatment is advisable, effective control can be obtained either by hand spray application of 0.05 pound of DDT in 1 gallon of fuel oil per acre or by airplane application at the rate of 0.05 to 0.10 pound of DDT per acre, applied as a 20-per cent solution in methylated naphthalenes, such as Velsicol NR-70 or Sovacide 544B.

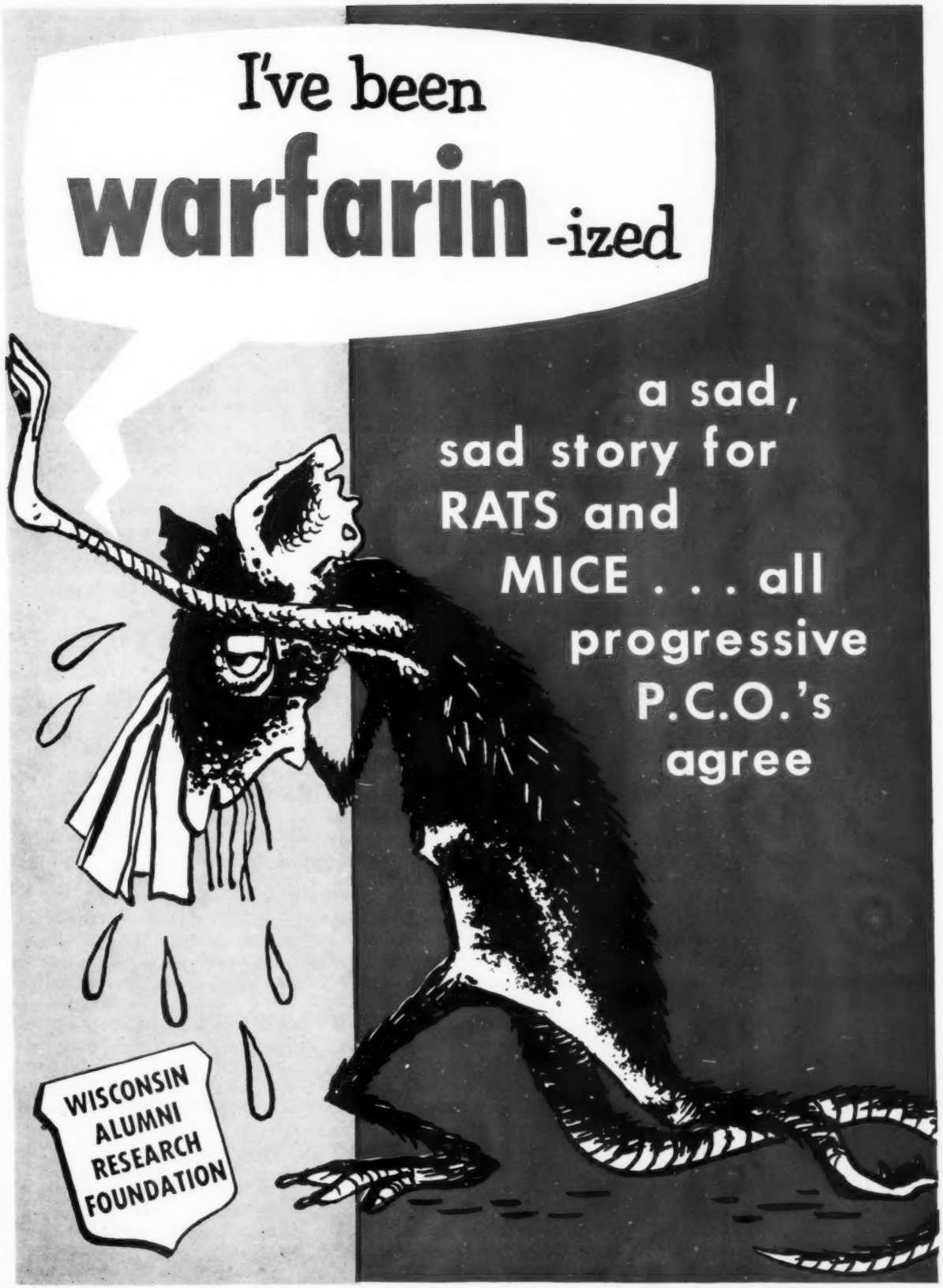
Among the culicine mosquitoes, the resistance of important pest species to DDT and other chlorinated hydrocarbon insecticides represents a major problem in their control, particularly in areas where pesticides are employed extensively. In the United States, resistance has been detected in *Culex tarsalis*, *C. pipiens*, *Aedes sollicitans*, *A. taeniorhynchus*, *A. dorsalis*, *A. nigromaculis*, *Psorophora confinnis*, and *P. discolor*.

In certain areas in Florida and in California, DDT treatments apparently are effective against pest species during the early part of the breeding season, but are of little value as the season progresses. While other chlorinated hydrocarbon insecticides still are being used as replacements for DDT in many mosquito abatement districts, there has been a growing trend towards the use of organophosphorus compounds such as malathion, EPN, and parathion. EPN applied at rates of 0.035 pound per acre by ground equipment and 0.075 pound per acre by airplane has been used effectively against resistant *C. tarsalis* and *A. nigromaculis* larvae in California. However, current information from the California State Department of Public Health indicates that malathion and parathion now are the principal organophosphorus pesticides used in mosquito abatement operations in that state. With ground equipment, application rates for malathion and parathion are 0.4 pound per acre and 0.075 pound per acre, respectively. Airplane treatments disperse malathion at a rate of 0.5 pound per acre, parathion at 0.1 pound per acre. Under the careful supervision exercised by the California State Department of Public Health, there has been no indication that these applications resulted in harmful effects to the operator or to the public. Special precautions, particularly with parathion, are followed in the handling and application of the pesticides. Care is taken to avoid treatment of populated areas or of areas near maturing food crops. Experimental data indicate that Chlorthion at dosages of 0.1 to 0.2 pound per acre also is effective against these resistant mosquitoes.

Studies in California on the control of adult *A. nigromaculis* by outdoor aerosol treatments have revealed malathion and Chlorthion to be more effective than BHC, DDT, or pyrethrum formulations in reducing annoyance by this species. Diesel oil formulations containing 5 per cent malathion or Chlorthion and dispersed at the rate of 12 gallons per linear mile, produced a 95 to 100 per cent reduction in the mosquito landing rates of *A. nigromaculis* for a distance of 100 yards from the machine.

In areas where resistance of the saltmarsh mosquitoes *A. sollicitans* and *A. taeniorhynchus* to the chlorinated hydrocarbon pesticides is at minimal levels, these materials are the insecticides of choice. At Savannah, Georgia, excellent nighttime control of adult saltmarsh mosquitoes has been obtained at a drive-in theater by single fog applications of 1 gallon of 2.5 per cent DDT, 1.0 per cent chlordane, or a pyrethrum formulation containing 0.25 per cent pyrethrins and 2.0 per cent piperonyl butoxide in a 1:1 fuel oil-kerosene solution. Application of the fog at or after dusk was essential to effective abatement. Treatment of the area before the major infiltration of the mosquitoes occurred gave poor results. Since these studies in 1953, routine applications of DDT fogs by the operator have continued to produce satisfactory relief from nighttime annoyance.

For control of nonresistant culicine larvae, DDT at dosages of 0.05 to 0.10 pound per acre is effective. Other chlorinated hydrocarbon insecticides, such as lindane, chlordane, heptachlor, endrin, and dieldrin, at 0.1 pound per acre can be utilized against DDT-resistant saltmarsh mosquito larvae. For penetration of heavily vegetated areas, granular formulations of these chemicals appear to be the most effective means of application. EPN and parathion at 5 per cent concentrations on bentonite, applied at a rate of 0.05 pound of toxicant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per acre, have given excellent reduction of saltmarsh mosquito larvae in studies conducted in Florida by the Entomology Research Branch, U. S. Department of Agriculture. Where concurrent adulticiding operations are conducted with chlorinated hydrocarbon insecticides, the application of the same type pesticides against larval infestations may foster the development of resistance to the extent that adult control measures also fail. Because of this adverse result, larvicidal operations should be minimal or the pesticide employed should be an organophosphorus compound.

In studies in Florida, adult DDT-resistant saltmarsh mosquitoes have been controlled by a fuel oil solution containing heptachlor or lindane applied by an airplane at a rate of 0.1 pound of toxicant per acre. Dieldrin at 0.2 pound per acre also gave satisfactory control. With ground equipment, BHC and heptachlor dispersed at respective rates of 0.04 and 0.07 pound of toxicant per acre provided excellent reduction of saltmarsh mosquito annoyance.

In areas where the mosquitoes are susceptible to dieldrin, a simple preflood application of dieldrin emulsion at the rate of 1 pound of dieldrin per acre may be expected to give satisfactory control of *Psorophora* mosquito breeding in irrigated ricefields throughout the rice growing season. However, the rapid development of resistance to dieldrin observed in *P. confinnis* and *P. discolor* in Mississippi indicated that effective use of this material as a residual larvicide may be limited to one or two seasons in some areas.

Field studies with organophosphorus compounds, either as granular preparations or as an injection in the irrigation influent, offer little promise that either procedure can be employed successfully to control *Psorophora* breeding under current methods of rice field irrigation in Mississippi. The rice fields are flooded by contour terrace irrigation wherein the water, to reach a given terrace, must pass through all terraces intervening between that terrace and the water source. Granular preparations of malathion, Chlorthion, and two experimental organophosphorus insecticides, broadcast at rates of 0.75 pound per

Technician demonstrates method used in the evaluation of insecticidal residues.

acre on dry plots one day before flooding, failed to give satisfactory reduction of *Psorophora* larvae in the flooded plots. In laboratory tests, malathion at a dosage of 0.05 ppm, and Chlorthion at a dosage of 0.025 ppm, gave 100 per cent mortality of *Psorophora* larvae in 24 hours. Similar mortalities for a 7-day period were obtained with malathion at 1.0 ppm and with Chlorthion at 0.25 ppm. Because of its superior effectiveness, Chlorthion was evaluated under field conditions by injecting it into the irrigation influent. A 2-acre plot of 18 terraces was flooded within a 2-day period with water containing 0.074 ppm of Chlorthion. Breeding was almost completely eliminated in terraces 1 - 9, but heavy infestations of *Psorophora* prevailed in the remaining terraces. Presumably the time element or the passage of water from terrace to terrace produced a loss in concentration or potency of the pesticide. In Arkansas, studies by the Entomology Research Branch, U. S. Department of Agriculture, have shown that where the fields are flooded directly from canals and not through successive terraces, a dosage of parathion of 0.02 ppm can give an effective kill of *Psorophora* larvae. Under these irrigation conditions, the treated water moved 0.6 mile in the canal and almost 0.4 mile in the field.

Although limited postflood treatments of malathion and Chlorthion at a dosage rate of 0.2 pound per acre were highly effective against *Psorophora* larvae, such applications are of little value in controlling infestations in rice fields, since the time period required to flood large acreages results in progressive hatching over a period of several weeks in different parts of the same field. Thus, the mosquitoes in one part of the field have completed their development to the adult stage before hatching begins in the parts of the field which are flooded last. The piecemeal or repeated postflood applications required to achieve satisfactory control of *Psorophora* breeding under such circumstances are impractical. In such situations, barrier-strip spraying around individual premises and the use of space sprays to control the adult mosquitoes in heavily populated areas appear to be the only practical approach to the problem for the present.

Barrier strip treatments with DDT around individual premises will afford relief from daytime annoyance by certain pest mosquitoes. In the Savannah, Georgia, area, DDT applied as a 1.25 per cent emulsion at rates of 5 to 10 pounds per acre to the outside of houses and to shrubbery, grass, and other vegetation within a radius of approximately 100 feet of the dwelling caused significant reduction in daytime annoyance from saltmarsh mosquitoes for periods of 1 to 9 weeks. Other pesticides — BHC (1.3 lbs. gamma isomer per acre), dieldrin (4 lbs. per acre), lindane (0.5 pound per acre)—were ineffective. In recent tests, malathion- Chlorthion- and Diazinon-sugar formulations, applied at a rate of 2 pounds of toxicant and 5 pounds of sugar per acre showed little promise as residual treatments for this purpose. The maximum period of relief with the Diazinon-sugar treatments was 1 week as compared with 5 to 6 weeks for parallel DDT applications at 5 pounds of DDT per acre.

Variations in the duration of effectiveness of the DDT treatments is attributed to mosquito

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potential, more frequent treatments being required whenever weather conditions permit excessive mosquito production. In 1952, 1954, and 1955, the application of 5 pounds of DDT per acre gave 5 and 6 weeks of relief from mosquito annoyance. In 1953, the same treatment was effective for 1 to 2 weeks.

Residual larviciding with technical BHC (12 per cent gamma isomer) emulsions at the rate of 1 pound per acre (in 2 gallons of finished spray per acre applied in the same manner as oil solutions) has given satisfactory mosquito control in small, landlocked, freshwater ponds near Savannah, Georgia, against a variety of anopheline and culicine species for periods ranging from 5 to 8 weeks. No damage to fish was observed during 3 consecutive years of treatments with BHC, during which time five treatments were made each year, spaced at approximately 5-week intervals between April and October, for a total of 15 1-pound-per-acre applications during the 3-year period. There was some indication of off-taste in fish from one of the treated ponds in which unusually low water levels had prevailed at the end of the third year of treatment. It appears that technical BHC (12 per cent gamma isomer) can be applied safely as emulsions at the rate of 1 pound per acre at approximately 5-week intervals for at least 3 consecutive years without damage to fish.

In ponds where fish are not present, effective control for periods ranging from 3 to 6 months has been accomplished by residual larviciding with DDT emulsion at the rate of 3 pounds of DDT per acre (in 2 gallons of finished spray), using the method usually employed in applying oil-mist sprays as mosquito larvicides. *This treatment is totally destructive to fish present in the ponds at the time of treatment and should not be used where fish are present.*

Dieldrin applied as an emulsion concentrate or as a wettable powder suspension at the rate of 1 pound of dieldrin per acre will also prevent mosquito breeding for more than 1 year in small, landlocked, fresh-water ponds. *However, it is completely destructive to certain other aquatic life* and should not be used except in emergency or in other unusual circumstances.

The significance of resistance in the field of mosquito control emphasizes the necessity of obtaining reliable data on its occurrence and magnitude. In 1955, studies by the U. S. Department of Agriculture and the California State Department of Public Health of the resistance levels of *A. nigromaculis* larvae in an abatement district where, since 1952, only organophosphorus insecticides have been used in mosquito control, showed a further loss in susceptibility to DDT by this species. Although DDT is not used for mosquito control in the area, it has been utilized for agricultural purposes. The susceptibility of the *A. nigromaculis* larvae to malathion was similar to that present in 1951.

The detection of resistance under field conditions is feasible without reliance on detailed laboratory tests. The initial finding of resistance to dieldrin in adult *A. quadrimaculatus*, *P. confinnis*, and *P. discolor* was accomplished by a simplified method developed by the Communicable Disease Center. Details of this technique can be obtained by writing to the Center.

FLY CONTROL

● Sanitation

Successful fly control is contingent upon improved environmental sanitation and the judicious application of insecticides. Prevention of fly breeding or fly entry reduces the disease transmission potential and at the same time increases the relative value of any chemical in diminishing fly prevalence. Consequently, sanitation and all other practices which will exclude flies from homes, restaurants, and other places frequented by man, should be exploited continuously to the greatest possible degree.

● Chemical Control Measures

The resistance of the house fly to the chlorinated hydrocarbon insecticides has been the major problem in the field of house fly abatement. In recent years, the production of organophosphorus compounds with low mammalian toxicity hazards and the development of new techniques for the application of the more toxic organophosphorus insecticides have marked definite advances toward solving this problem.

The encouraging aspect of this progress has been the absence of any resistance in *Musca domestica* in the field to organophosphorus compound despite the widespread usage of these pesticides in the United States. It has been demonstrated that under laboratory selection house flies can become 10 to 20 times as resistant to organophosphorus compounds as are nonselected strains. In addition, laboratory selected strains resistant to DDT or Dilan have been found to be much less susceptible to one of the candidate organophosphorus compounds than either a dieldrin or a multi-resistant strain.

These findings again focus attention upon the need for routine evaluation of the susceptibility levels of the house fly population in any control program. Only by this means can it be effectively determined when an insecticide begins to lose its toxicity to house fly populations.

● Residual Treatments

In areas where house flies are susceptible to DDT, this chemical is still the insecticide of

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choice, except in dairy barns or other situations where it may contaminate milk or food. Finished emulsions or suspensions of 5 per cent DDT will provide effective residues when applied to the point of run-off. For outdoor application, the addition of pine gum rosin to give 2 per cent rosin in the finished formulation augments the durability of the DDT residues.

Where DDT - resistant house fly populations develop, a number of other chlorinated hydrocarbons can be utilized as initial substitutes. In time, the flies may develop resistance to one or all of the substitute chemicals, but the onset and rate of development of resistance is contingent upon the locality and the history of insecticidal treatment. Dieldrin, applied as a 0.625 or 1.25 per cent emulsion on exterior surfaces of houses (including porches) and in animal shelters, has provided satisfactory control of DDT-resistant house flies. In certain instances, house fly populations have developed dieldrin resistance within 2 months after the initial treatment with this pesticide, but in other localities the chemical has given excellent results for 2 years.

Chlordane also is effective initially against DDT - resistant house flies and should be used as a 5 per cent emulsion for treating porches and semiprotected exterior surfaces. Application within homes should be limited to treatments of selected surfaces such as doors, window sills, and screens, using a 2.0 to 3.0 per cent formulation.

Lindane applied at the rate of 25 mg. per square foot, or methoxychlor at 200 mg. per square foot is suitable for use in dairy barns, feed barns, and other places where the use of other chlorinated hydrocarbons is not permitted.

Further studies of the use of certain chlorinated hydrocarbon insecticides as residual agents in the control of house flies in privies again emphasize that such treatments augment rather than decrease the production of *M. domestica* from these sites. Privies which normally were poor sources of house fly production became excellent sites for the propagation of this species after treatment with dieldrin. BHC, aldrin, or chlordane caused similar effects except to a lesser degree. By compartmenting the individual privy into two separate units, it was possible to demonstrate in six privies an increase in house fly production in the treated compartment over that in the untreated section. The paucity of house flies produced in untreated privies, and the increased breeding of *M. domestica* in sprayed privies indicate that treatment of privies with dieldrin, aldrin, BHC, or chlordane should be avoided.

Dilan is most effective in the control of DDT-resistant house flies when combined with DDT and cottonseed oil. This formulation applied at rates of 200:200:80 mg. of Dilan:DDT:cottonseed oil per square foot has satisfactorily controlled house flies for periods of 5 to 8 weeks in experi-

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mental barns. It can be utilized as a residual treatment, except in dairy barns and other locations where milk and food contamination may result.

Residual bait sprays containing an organophosphorus toxicant currently are an effective means of achieving an immediate reduction of resistant house fly populations. Compounds such as malathion, Chlorthion, and Diazinon possess human toxicity levels which permit their safe usage as residual sprays at strengths of 1 to 2.5 per cent. However, where individuals are engaged in making routine applications of these toxicants, particularly Diazinon, it is desirable to maintain a periodic check on their cholinesterase levels.

Laboratory studies have shown that the addition of sugar to emulsion formulations of malathion, Diazinon, and other candidate organophosphorus insecticides augments the residual efficacy of their deposits. Residues of one candidate pesticide at 200 mg./sq. ft. gave 5 to 31 per cent mortalities of resistant house flies for 15 weeks, whereas deposits of this toxicant (200 mg./sq. ft.) with sugar (400 mg./sq. ft.) yielded 99 to 100 per cent mortalities during the same time period. As a general rule, sugar is added to organophosphorus formulations at a rate of 2.5 parts of sugar to 1 part of the toxicant.

Malathion-sugar emulsions or suspensions applied in dairy barns at rates of 200 mg. of malathion and 500 mg. of sugar per square foot have provided excellent house fly control for periods of 1 to 5 weeks. In earlier tests, reported differences in the duration of effectiveness of deposits from emulsion and suspension formulations were due to conditions in the barns so treated. It appears probable that the erratic results occasionally encountered with malathion treatments also may be due to this factor. Malathion is approved for use in dairy barns.

Diazinon - sugar formulations applied at a rate of 100 mg. of Diazinon and 250 mg. of sugar per square foot in dairy barns have yielded excellent control of

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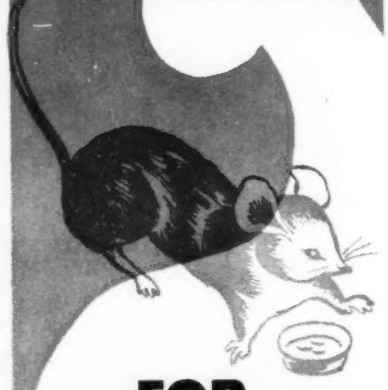

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house flies for periods of 4 to 5 weeks. Other investigators have reported similar results using Diazinon at 0.5 and 1.0 per cent strength instead of the 2.5 per cent levels given above. However, the rate of application with these low concentrations was 1 gallon per 200 to 300 square feet of area as compared to the rate of 1 gallon per 1000 square feet employed with the 2.5 per cent formulations. Diazinon has been accepted for use as a residual treatment in dairy barns.

Chlorthion-sugar emulsions and suspensions sprayed at a rate of 100 mg. of toxicant and 250 mg. of sugar per square foot have provided excellent control of house flies in dairy barns for periods of 5 to 6 weeks. This pesticide is approved for use as an emulsion and suspension formulation in dairy barns, but applications are to be avoided in areas where milk is processed or stored.

Reports indicate that at times the presence of sugar residues on barn surfaces results in unsightly growths of molds. However, in the Savannah, Georgia, area where bait sprays have been employed in the treatment of experimental barns for several years, application of 250 to 500 mg. of sugar per square foot has not resulted in mold contamination even in barns treated three to four times.

The use of the organophosphorus compounds, such as parathion and Diazinon, as cord impregnants represents a means of achieving effective house fly control on a season-long basis. A single installation of cotton cords (3/32″ diameter) dipped in a 5 to 10 per cent parathion-xylene solution, or of similar cords (3/16″ diameter) immersed in a 25 per cent Diazinon-xylene solution has yielded satisfactory to excellent control of house flies for periods of 5 to 6 months in experimental barns. In certain tests removal of the cords in midsummer resulted in an immediate rise in fly densities to levels of 120 to 150 flies per grill count. Reinstallation of the removed cords (without any additional treatment) again reduced fly densities to levels of 3 to 15 flies per grill count. Available data indicate that for maximum periods of effectiveness with Diazinon the larger size cord (3/16″ diameter) is necessary since the use of the smaller size cord (3/32″ diameter) did not provide adequate control of house flies in experimental barns for more than 7 weeks. The installation rate of these cords is 30 linear feet of cord per 100 square feet of floor area. Usually a period of 2 to 3 weeks after cord installation is required before fly densities are reduced to control levels. This time period is more characteristic of parathion-impregnated cords, the Diazinon - impregnated cords usually producing an immediate decline in fly densities. However, with parathion, extended control can be achieved with the smaller diameter cord (3/32″ diameter).

Parathion - impregnated cords (3/32″ diameter) also have given 8 to 11 weeks of satisfactory fly control when installed in the barns, kitchens, and on the porches of rural premises. Excellent house fly control was obtained with such cords for a 10-week observation period in military dining halls and kitchens. In the latter, Diazinon - treated cords (3/32″ diameter) treated in a 25 per cent Diazinon-xylene solution, remained effective for 7 weeks.

The extreme toxicity of parathion emphasizes the need for utmost precaution in preparing and handling the 5 to 10 per cent dipping solution. Preparation of the treated cords should be handled only by experienced formulators. Both the public and pest control operators should only use commercially prepared cords. Parathion-treated cords have been approved for commercial preparation for use in dairy barns. For routine installation of the treated cords, the individual should wear cotton gloves. Periodic checks also should be made of the cholinesterase levels of all personnel routinely preparing or handling treated cords. As a maximum safeguard, impregnated cords should be colored or marked to avoid their possible use for purposes other than fly control. Details on the precautionary procedures for parathion are found in the Clinical and Operational Memoranda issued by the Communicable Disease Center.

Although Diazinon has a lower toxicity level to humans than parathion, procedures similar to those outlined for that pesticide should be followed in the preparation and marking of Diazinon-treated cords.

● Poison Baits

Poison baits continue to receive widespread popular accep-

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tance as a means of accomplishing fly control. The basic formulation of liquid and dry baits consists of an organophosphorus toxicant and a fly attractant (molasses, sugar, or other). Pesticides commonly employed in baits are malathion, Dipterex, and Diazinon. The attractant portion of the baits may be replaced in part by inert diluents of various types.

Liquid baits generally are composed of 0.1 per cent toxicant and 10 per cent attractant. Application is usually by means of a sprinkling can, and the bait is distributed at a rate of 1 gallon per 1000 square feet of floor area. If the floor surface is dirt, or is covered with debris, the bait should be sprinkled on paper or on metal or wooden sheets.

Dry baits are formulated to contain 1 to 2 per cent toxicant and an attractant. The latter may be granulated sugar or an inert carrier coated or mixed with an attractant. Such baits are scattered over the floor surfaces at a rate of 2 to 4 ounces per 1000 square feet. Where debris is present, the bait should be placed in a container or on a sheet of wood, metal, or other relatively smooth material.

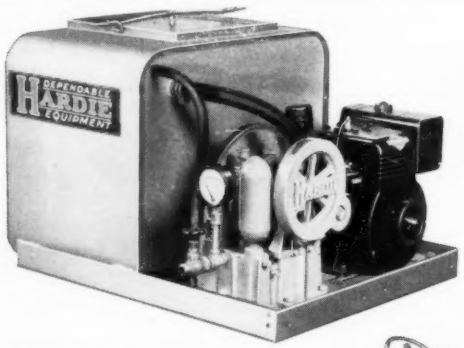
General coverage of the floor area with either type of bait is not desirable. Observation will show the sites of greatest fly concentration, and bait applications should be made at those points. Occasionally it may be necessary to utilize sites other than those at the floor level (window sills, stanchions).

The frequency of bait application depends largely upon the fly potential present. Where the potential is high, repeated applications are necessary. In a 4½-month test at Savannah, Georgia, using a liquid poison bait containing 0.1 per cent Dipterex, the bait was reapplied as house fly densities indicated. Results indicated that the intervals between retreatment varied from 2 to 11 days with a general rate of 2 to 3 applications per week. Weekly evaluation of fly densities for a 3-month period in four barns in which owners applied poison baits showed fluctuating levels of reduction; only one dairyman achieved acceptable abatement.

Although poison baits are employed chiefly against house flies, studies in Florida have shown that these measures can be used for the control of blow flies in dump areas. Baits containing 2 per cent malathion, Chlorthion, or Dipterex, and 50 per cent black strap molasses in water have given excellent reduction of both blow flies and house flies at such sites.

The principal values of poison baits lie in their relatively low cost per treatment and in their immediate suppressive effect upon fly densities. Bait treatments can produce spectacular reduction of high fly densities within a few hours. However, this effectiveness is of short duration unless further applications are made.

Since the main disadvantage to poison baits is the need for repeated treatments, studies have been made on the establishment of bait stations. By concentrating



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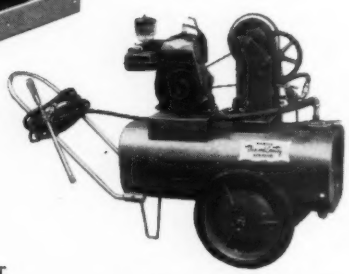

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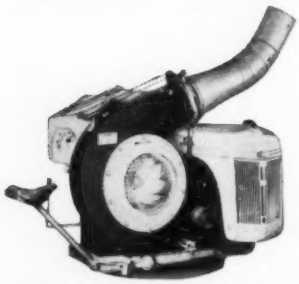

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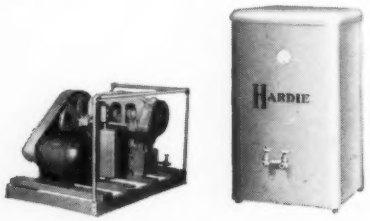

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Pear	Beans	Eggplant
Plums	Broccoli	Onion
Prunes	Rutabaga	Peas
Blueberry	Cucumber	Peppers
Cranberry	Squash	Potato

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Apricot	Beets	Turnips
Avocado	Celery	Brussels Sprouts
Dates	Cauliflower	Lettuce
Peaches	Cabbage	Spinach
Pineapple	Mustard	Clover
Alfalfa	Kale	

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dry baits containing malathion in plywood trays (18″ square) covered with hardware cloth, and then placing these trays at selected sites of heavy fly densities around experimental barns, continued kills of house flies have been obtained for 2 to 3 weeks without replenishment of the baits. In addition, bait stations consisting of paper coasters or screen squares (4″) coated with 25 grams of a slurry of 2 per cent toxicant and varying amounts of sugar and/or sand, agar, or other components have been developed and tested by the Entomology Research Branch, U. S. Department of Agriculture. The coaster or screen square is attached to a wooden tongue depressor, and these units are placed at fly attractant or breeding sites. With malathion or Dipterex baits of this type, effective control was achieved where an adequate number of such stations (10 to 150) was employed and suitable sanitational levels prevailed.

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Baits containing malathion, Dipterex, or Diazinon have been labeled for use in dairy barns. None of these baits should be used inside homes.

● Outdoor Space Sprays

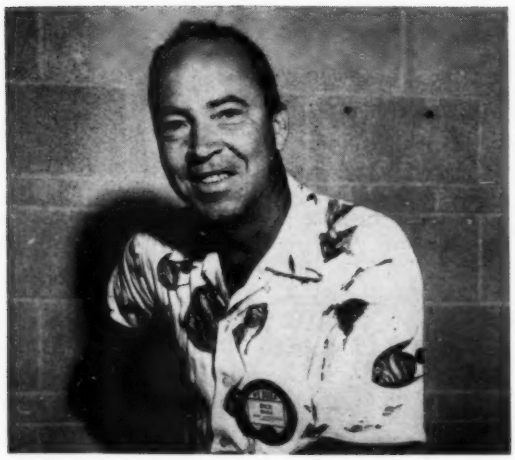
Where house flies are no longer susceptible to available residual or larvicidal treatments, space sprays are the only alternative for chemical control in a community program. Daytime applications on an areal basis are generally used in municipal operations, but nighttime treatments of specific fly resting sites offer promise, particularly at animal shelters, abattoirs, and dumps where heavy fly concentrations normally exist. During cool weather, house flies move inside of buildings at night, but when warm weather (minimum daily temperature 70° F. or above) prevails, this species tends to rest on shrubs, high grasses, and the lower limbs of trees. Where fly populations are high, the nighttime use of space sprays is of value. For best results, surveys to determine the nighttime fly resting sites should be conducted in order to guide spray operations. As space sprays are toxic only to the flies coming in contact with the insecticidal droplets, treatments must be repeated at frequent intervals for satisfactory fly control.

Combinations of DDT with DMC at ratios up to 20:1 have yielded satisfactory mortalities of DDT-resistant flies. In field usage, a ratio of 7.5:1 of DDT: DMC proved effective against house flies resistant to several chlorinated hydrocarbons. Emulsions or fuel oil solutions of this combination should contain 5 per cent DDT.

DDT-resistant house flies also can be killed by a 2.5 per cent Dilan emulsion applied at a dosage of 0.1 pound per acre, or by 2.5 per cent chlordane emulsions sprayed at a rate of 0.2 pound per acre.

Where flies are resistant to DDT and chlordane, a 5 per cent technical BHC (12 per cent gamma isomer) emulsion or a 2 per cent lindane emulsion may be used effectively for outdoor space

How DICK EVANS of Wichita Kansas . . .



CONTROLS RESISTANT ROACHES

"We have been using Malrin for the control of resistant German roaches and have had excellent results to date. In the case of one resistance job, we swept up two dust pans full of dead roaches before leaving the premises. After three weeks the customer has not reported any further trouble or evidence of any further activity.

"We have additionally used Malrin as an outside spray with sugar added and the results, as far as fly control is concerned, are far superior to anything we have used to date. The odor problem is practically non-existent."

DICK EVANS PEST CONTROL

Dick Evans is one of the more progressive individuals in the pest control industry and has continuously worked for the welfare of the industry as a whole as well as for his own business, the Dick Evans Pest Control Company. He is one of the leaders of the local and state pest control organizations in Kansas and is to be congratulated for his untiring contributions. The above cited experience with Malrin, as well as others which have appeared or will appear, is a factual and unedited report. The cooperating pest control operators have not been reimbursed in any way and their primary purpose is in reporting their experience with this new material to the industry.

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PP-PCO are identification letters for this DC-3, twin-engine passenger plane for the Panair Do Brasil airlines, of Rio de Janeiro, Brazil. All Panair Do Brasil planes are designated "Bandeirante," which means pioneer in English, so this aircraft has the distinction of being labeled Pioneer Pest Control Operator. Gracias, Amigos! and thanks to reader E. B. Twyman of John Powell y Cia, Buenos Aires, who spotted this plane on one of his sales flights.

spray treatments. If odor is not a factor, the technical BHC is favored because it is cheaper.

Pyrethrum space spray is the least toxic to man and is among the most reliable as an insecticide. For indoor space spray treatments, it is the insecticide of choice. Pyrethrum formulations are used in combination with synergists (piperonyl butoxide, sulfoxide, and other) in emulsions or oil solutions containing from 0.05 to 0.1 per cent pyrethrins and from 0.5 to 1.0 per cent of the synergist. While pyrethrum formulations usually are too expensive for general large-scale application in fly control, their use at problem sites is frequently feasible.

Preliminary tests indicate that malathion in fuel oil will provide effective kills of resistant house flies when applied by a mist blower at a rate of 0.5 pound of malathion per acre.

● Larvicides

The use of larvicides may be desirable for fly control in certain situations, as in the treatment of dirty garbage cans, or concentrated fly breeding areas such as stockyards or chicken farms. Several of the chlorinated hydrocarbons are effective fly larvicides, but their use may cause, and possibly accentuate, the development of the same resistance encountered when they are used as adulticides. Where house flies are not resistant to them, chlordane, lindane, BHC, dieldrin, and aldrin can serve as effective house fly larvicides. These materials should be applied at the same dosages per square foot as recommended for residual sprays. In general, it appears desirable to dilute the residual spray emulsions or solutions to three to five times their usual volume to provide for better penetration of the larval breeding medium. In view of the effect of chemical treatment upon house fly production in privies, the latter should not be sprayed with dieldrin, aldrin, BHC, or chlordane.

Laboratory studies of EPN, parathion, Diazinon, and malathion indicate that Diazinon is the most effective larvicide against *M. domestica*. With larvae of all ages it provided maximum mortalities at minimal dosages in comparison to the other toxicants. In limited field treatments of house fly infested chicken droppings, Diazinon at a rate of 50 mg. per square foot proved highly effective. Similar applications of Chlorthion gave results inferior to those obtained with Diazinon. In California, the U. S. Department of Agriculture and the California State Department of Public Health found Diazinon to be markedly superior to Chlorthion and malathion as a fly larvicide in chicken droppings. At a dosage of 50 mg. per square foot, the percentage reduction for Diazinon was 100 as compared to less than 15 per cent reduction for malathion and Chlorthion.

Small-scale field tests show that paradichlorobenzene crystals (PDB) applied at the rate of 2 ounces per garbage can will control house fly breeding for 1 to 2 weeks. This procedure is effective in areas where flies are resistant to other types of larvicides.

As blow flies continue to remain susceptible to chlorinated hydrocarbons, these chemicals are effective in preventing blow fly infestation of carcasses and in controlling established blow fly infestations in carcasses. Limited studies have shown that dog carcasses sprayed with 1 pint of 0.25 per cent aldrin, endrin, or Diazinon emulsion were protected from blow fly infestation for 26 to 30 days. Chlordane (0.5 per cent), BHC (1.0 per cent, (15 per cent gamma)), and malathion (0.25 per cent) were less effective. In carcasses heavily infested with larvae, 0.25 per cent emulsions of endrin, Diazinon, and malathion, and 0.5 per cent emulsions of dieldrin and aldrin gave complete kill of full grown maggots. Concentrations of 2.0 per cent chlordane and 5 per cent BHC were required for effective reduction of the infestations.

The control of fly larvae resolves itself more into a problem of application than one of the availability of a compound toxic to the larvae. In all larvicidal treatments, emphasis must be placed upon getting the insecticide to the site where it can act upon the larvae. Since most larvicides also act as adulticides, spray applications should be directed to locations where the emerging adults will contact the chemical as they leave the breeding media.

FLEA CONTROL

The oriental rat flea, *Xenopsylla cheopis*, is readily controlled by the application of a 5 or 10 per cent DDT dust to rat runs and harborage areas. While the 5 per cent dust is equal to the 10 per cent formulation in its effectiveness on *X. cheopis*, the greater toxicity of the 10 per cent dust to other ectoparasites normally less susceptible to DDT, such as the cat flea, makes it the formulation of choice.

In many areas, dog and cat fleas, *Ctenocephalides canis* and *C. felis*, are reported to be resistant to control by DDT and

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chlordane formulations. However, such resistance has not been evident in specimens which have been laboratory tested at the Entomology Research Branch, U. S. Department of Agriculture. Based on the increasing number of complaints concerning the ineffectiveness of DDT and chlordane applications against flea infestation in yards and on pets, flea control has become an acute problem in the last few years.

Where cat and dog fleas are not resistant to chlordane, a 10 per cent dust of this toxicant is much more effective against soil infestations than is a similar dosage of DDT. The rate of application of the 10 per cent dust is 10 pounds per acre. Against cat and dog fleas resistant to DDT and chlordane, studies by the Entomology Research Branch, U. S. Department of Agriculture, indicate lindane and malathion emulsions applied at a rate of 10 mg. per square foot to be effective. In addition, recent field tests by this agency show that a 2.0 per cent malathion emulsion applied to infested yards at a rate of 1 gallon per 1000 square feet gave 99 per cent control of the fleas for 4 weeks. Other workers report a 4.0 per cent malathion dust to be highly effective against cat and dog fleas.

Malathion as a 4.0 per cent dust or as a 0.5 per cent spray is acceptable for use in controlling fleas on dogs and cats.

ROACH CONTROL

Chlordane as a 2.5 per cent emulsion or solution, and dieldrin as a 0.5 per cent solution or a 1.0 per cent dust are effective in controlling cockroach infestations except in localities where resistance to chlordane has been manifested by the German roach, *Blattella germanica*. Treatment in homes and food establishments should be made to cockroach harborage areas and runways, such as cracks and crevices, behind and along baseboards, and around openings through which these insects may gain entrance from outdoors.

Since 1952, reports indicate a gradual increase in the number of localities where the German roach no longer can be controlled by chlordane sprays. Against such resistant roaches, malathion residues are effective; but the residual life of these deposits is limited and the odor of the pesticide may restrict its usage. Malathion sprays should be applied as outlined above using a 3 per cent solution or emulsion. Similar formulations of malathion (1 part) and perthane (2 parts) applied at a concentration of 4 per cent also are suitable for control of resistant German roaches.

Sodium fluoride and pyrethrum (1.0 per cent pyrethrins) dusts are of value against resistant roaches. In addition, aerosol formulations containing pyrethrum alone or in combination with DDT or chlordane provide a rapid means of reducing heavy roach infestations.

Fogs for Frost Control?

An Indiana operator reports he has successfully staved off frost damage to a large tomato field by running his Dyna-Fog between the rows just before forecasters have predicted frost would bite the fruit. Two applications about an hour apart, of fuel oil alone seems to do the trick. Would this work in the citrus groves of Florida and California?

BED BUG CONTROL

Although bed bugs have shown resistance to DDT residues in certain areas, this insecticide still remains the pesticide of choice for the control of *Cimex lectularis*. The use of 5 per cent DDT emulsions or solutions applied to the baseboards, wall crevices, bedsteads, and mattresses of infested rooms provides excellent control of bed bugs in most areas. Laboratory studies by the Entomology Research Branch, U. S. Department of Agriculture, have indicated lindane to be more effective against DDT-resistant bed bugs than dieldrin, aldrin, or chlordane.

RODENT CONTROL

The importance of sanitation, including proper garbage disposal, food storage, harborage elimination, and ratproofing, must be emphasized. Sanitation is essential to the permanent control of commensal rats and mice, and the use of rodenticides should be regarded as supplementary to sanitation.

The situation with regard to rodent control is quite encouraging, since rats, unlike insects, do not appear to have developed resistance to the available poisons. The slow-acting rodenticides, including warfarin, pival, coumachlor, and fumarin, are preferred for use in most situations because of their effectiveness and low degree of toxic hazard to humans and useful animals. Of this group, warfarin and pival have had the widest use in this country.

• Warfarin

It has been shown that the susceptibility to warfarin of the various species of commensal rodents differs. Accordingly, in the interest of economy and safety, the lowest bait concentration consistent with the most effective control should be used.

Dependable control of the roof rat *Rattus rattus* requires the use of a concentration of 0.250 mg. of warfarin per gram of bait (0.025 per cent). However, field tests have shown that a concentration of 0.050 mg. per gram (0.005 per cent) is effective for control of the Norway rat *(R. norvegicus)*. Mice react in the same general way as Norway rats, although they show more individual variation. There is evidence that under certain conditions Norway rats may be controlled a little more rapidly, though no more surely, by using 0.100 mg. of warfarin per gram of bait instead of 0.050 mg. per gram. There is a real opportunity for those associated with city and county programs to determine, by careful operational observations, which of these two concentrations is the more desirable for use in organized control campaigns. However, where the species of rat concerned is not definitely known, the 0.25-mg.-per-gram concentration should be used.

Warfarin baits may be used for initial rodent control under essentially all conditions, using a

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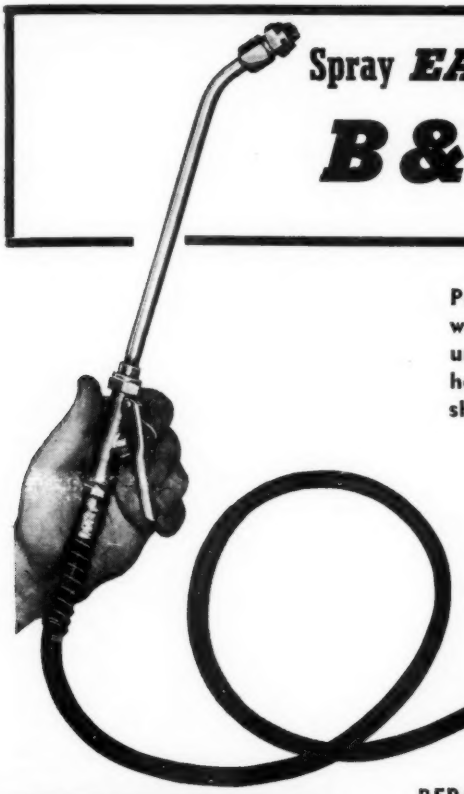

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minimum baiting period of 2 weeks. In places which are subject to reinfestation, consideration should be given to establish-the control of rats in those permanent control of rats in places which are subject to reinfestation. Two years of experience at Savannah, Georgia have shown that Norway rats can be controlled in non-ratproof buildings so long as poisoned bait is available, but eradication was not achieved. . No difference in the residual effectiveness of the 0.100- and the 0.050-mg.-per-gram bait concentrations was observed. The bait stations were inspected approximately every 6 weeks and fresh poisoned bait was supplied.

● Pival

Pival (2-pivalyl-1,3-indandione), a more recently introduced compound, appears, in a general way, to be approximately equal to warfarin in its rodenticidal effectiveness. In both laboratory and simulated field tests, the acceptance of pival baits by roof rats, Norway rats, and mice has been good. Laboratory tests showed that pival and warfarin were about equally good for mouse control. Against roof rats, pival was shown to be slightly better than warfarin in the laboratory and about the same under simulated field conditions. Both laboratory and simulated field studies indicated that pival in solid bait was somewhat inferior to warfarin for control of the Norway rat, but that pival-poisoned water (0.006 per cent acid equivalent) with 5 per cent sugar as an attractant was slightly more effective against this species than a comparable formulation of warfarin (0.005 per cent acid equivalent).

Corn meal, as well as some of the other ground grains, has proved to be a good bait material for use with rodenticides which require repeated acceptance over several days. However, in many areas the meal becomes insect-infested after several days of exposure and must be replaced at frequent intervals with fresh bait in order to assure continued acceptance by rodents. Pival has been found to inhibit the development of a number of insects that infest grain, including flour beetles (*Tribolium* sp.), cigarette beetles (*Lasioderma serricorne* (F.)), saw-toothed grain beetles (*Oryzaephilus surinamensis* (L.)) and flour moths (*Ephestia* sp.). Cockroaches, however, were not affected when fed for 30 days on bait containing 0.25 mg. of pival per gram of bait.

● Antu

ANTU still holds a definite place as a quick-acting poison for the Norway rat. Its use to reduce large populations rapidly may be followed by the use of anticoagulant rodenticides to achieve complete and lasting control. ANTU should not be used against the same populations more often than about once a year. It induces a persistent bait shyness in rats, and this property makes ANTU ineffective for repeated use against the same rat population. ANTU is not effective for the control of roof rats or mice. Its safety record is good and it may

(Continued on page 64)

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Successfully Used for over 11 Years in Community Fly and Mosquito Programs

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Tifa was the first in the field of fog applicators. Tests have proved it best in the field for space control around the community . . . on the dump, over pools, in suburbs, everywhere insects swarm!

This amazing machine discharges newly-developed insecticides as well as the older types in a true, clean fog which spreads quickly and permeates the deepest crevices. This ability means a better insect control program for your community. Put Tifa to work for you.

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Commercially available to Pest Control Operators, Diazinon offers positive, economical results. Its quick killing action and long lasting residual properties make it a "must" for all Pest Control Operators in roach control service work.

Diazinon is extremely economical . . . only 2½ fluid ounces of GEIGY DIAZINON 25E (25% emulsifiable) per gallon of water, applied as a spot treatment, to baseboards, around water pipes and other areas frequented by roaches, gives sure and fast results. Positive residual control reduces the number of service calls and repeat applications required.

Diazinon is recommended for cockroach control by Pest Control Operators *only*. Reduce your roach control service costs with GEIGY DIAZINON 25E.

Available in pint, gallon, and five-gallon containers through the principal distributors of chemicals to the Pest Control Industry.

ORIGINATORS OF Geigy DDT INSECTICIDES

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20th Purdue Conference Updates PCOs For Their Role in Grain Sanitation With Warning New Talents May Be Required

Retiring Founder of the University-PCO Conference Idea, Prof. J. J. Davis, Honored by 350 Attending 5-Day Meet

Despite skepties who think PCOs have no place in the government's budding clean grain program, industry delegates to last month's 20th Purdue PCO Conference were shown they do have an important role to play. There's money in it for those who are willing to arm themselves with the specialized knowledge required.

Some 350 delegates attending the January 30-February 3 meeting heard reports from county agents in the country's grain belt say farm-stored grain is proving hard to keep in condition. Lacking experience and the necessary equipment, farmers are beginning to look for a packaged sanitation and pest control service performed by experts.

Walter Weber of the Indiana Farm Bureau Cooperative spelled out in detail where the PCO belongs in the clean grain program. "They're needed," he said, "to inspect storage facilities, to detect rodent gnawings, burrows, tracks, droppings, smears, and the presence of insects. Once the condition is ascertained, pest control authorities must advise farmers what rat and bird proofing and bin cleaning needs to be done. "And," Weber explained, "they need you to do residual spraying, bin fumigation, placement of rodenticides, and to keep an eye on the moisture and heat condition of their grain."

Because grain can be contaminated anywhere along the line from field to the packaged product, the problem facing producers, handlers, warehousemen and processors is three-fold, according to James I. Herring, assistant chief in the Chicago office of the Food & Drug Administration.

1. They can experience high economic losses due to contamination and destruction by insects, rodents and birds.

2. There is increased risk to the owner of grain in storage or transit because contaminated grain declared unfit for human consumption will degrade stocks to a lower income producing commodity.

3. All fear possible consumer resistance to cereal foods when the public suspects they were not produced from clean grain. This lower consumption of food grains and their products would affect the whole food industry.

• Which Insects?

Detection of insect presence in stored grain is relatively easy when the whole insect is involved; fragments are more difficult to discover.

Purdue's professor in charge of the university's 4-year course for PCOs, John V. Osmun, listed those insects which are identifiable by their damage. Pests which attack sound grain, usually from within the kernel, are weevils, lesser grain borers, Angoumois grain moths, flat grain beetles, and the Cadelle.

Insects which attack damaged grain and chaff include such scavengers as **Tribolium**, Indian meal moth, and "bran beetles." Those which prefer spoiled grain, or that with high-moisture content are meal worms and fungus beetles.

In food processing machinery, PCOs are likely to find the Mediterranean flour moth and the Cadelle.

Processed foods are subject to attack by the greatest variety of insects: bran beetles, Indian meal moths, drug store and cigarette beetles, black carpet beetles, spider beetles, silverfish, and **Trogoderma.** The last is an important problem in the dried milk industry.

• Microanalysis Detection

Two methods of microanalysis detection to spot insect fragments, rodent hairs, droppings, etc. were demonstrated by William Bishop, laboratory technician from the Lauhoff Grain Co. in Danville, Ill.

The flotation or light method, brings deleterious material to the top of testing media, while the sedimentation or heavy method settles fragments to the bottom.

Findings are then transferred to lined filter paper and put beneath a microscope for counting to determine the extent of contamination. Procedural details of these two techniques are described in the Tentative Official Methods of Analysis, 7th edition, published in 1950 by the American Association of Agricultural Chemists.

Some grain producers use a General Electric (X-ray) Grain Inspection Camera to detect the

Industry friends showed their appreciation for the 20-year guidance Purdue entomology chief, **Prof J. J. Davis** (center) has given PCO conferences, by presenting him with a T.V. set, leather book of commemorative letters, and an illuminated scroll. Ceremonies were conducted by NPCA officers, (l. to r.) **R. C. Yeager,** past pres.; **I. B. Carncross,** '56-'57 pres.; **C. Norman Dold** (2nd from right), past pres.; and **Dr. Ralph E. Heal,** executive secretary.

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The new B & G gun jet shut-off, attached to the Sub-Slab Injector, is a nozzle unit that has been developed to accurately control the pressure injection and sealed delivery of liquids and gasses from adjustable full-open to full-shut, thus eliminating costly waste. The Sub-Slab Injector has proven itself successful every time in delivering substantial penetration and lateral spread.

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2 This tightening expands the collar against the side of the hole. This action permits the high pressure injection of liquids or fumigants without leakage. The nozzle cannot be withdrawn during operation.

SUB-SLAB INJECTOR WITH GUN JET SHUT-OFF $30.75
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presence of insects, Weber reported.

• Similarity of Detection Techniques

The principles of infestation discovery are basically the same regardless of location. Usually the same group of insects follows a grain product all the way through its production, according to Dr. Lyman S. Henderson of the Department of Agriculture's Stored Product Insects Section in Washington.

"Prevention and control techniques are very closely related, with prevention often more difficult than control," he observed. "But, the Food & Drug Administration wants clean food, not cleaned food, so our emphasis must be on prevention."

But regardless of this FDA objective, infestations do occur and every known control measure must be utilized to keep them depressed. Dr. Henderson recommended periodic inspections of stored grain in warm weather be made at least once a month, and in some situations, more frequently.

• "Pockets of Infestation"

Largest single source of stored grain infestation comes from little "pockets of infestation," Lee Truman of Pest Control Services in Indianapolis, told PCOs. Try to discover **where** the trouble comes from, find it, and the method of control will be usually effective. "Don't hasten to blame the chemical, or the equipment, but recheck your treatment methods to see if you have overlooked a small pocket of contamination which may even be outside the area you have treated. They may be a major cause for 'call-backs'" Truman predicted.

Typical of such small pockets which can blossom into large problems are those caused by the Cadelle hibernating in burrows of wooden bins, or by infested feed and other materials near storage. Some insects cluster together in colonies to survive winter.

Preventive measures call for removing or changing the factors which eventually cause abundant populations, the most common of which are **1.** food supply, **2.** temperature and humidity, **3.** presence of parasites, and **4.** insanitation.

• Check List for Stored Grain

Truman listed eight ways to obtain stored grain pest control: **1.** keep grain clean; remove broken kernels if possible, **2.** keep moisture content low (below 11% if possible), **3.** take advantage of low winter temperatures when activity is usually at its lowest ebb, **4.** clean bins thoroughly before putting grain in storage, **5.** get rid of all debris and spilled grain from areas around storage, **6.** do not store infested materials anywhere near stored grain, **7.** spray inside surfaces of bins before putting grain in storage, and **8.** fumigate or use grain protectants.

• Re: Food Products

Continuing, PCO Truman outlined what can be done to protect stored food products. Remove food supply which supports insect infestations, he advised. Clean up surrounding exterior areas of food plants as well as interior floors and suspect areas in warehouses. Get rid of infested products in stores and homes.

Low temperatures and humidities discourage insect growth. That's why Truman recommends raw products be kept in cold storage warehouses if possible, that refrigeration be used for high-value products, and that moisture content be maintained at a low level.

Use of residual sprays where possible, or contact sprays if necessary were the insect controls recommended. Covered baits are needed for rodent control after buildings have been rodent-proofed.

Elementary is the requirement that all food products be stored in clean, tight containers.

• Chemical Controls

Fumigation expert, J. Larry Maxwell of The Dow Chemical Company, explained the new "forced recirculation" technique of methyl bromide application which takes advantage of the fumigant's low boiling point, rapid vaporization and high penetrating insect killing advantages and overcomes previous difficulty to obtain uniform distribution of the gas.

The forced recirculation of methyl bromide has now been developed, Maxwell said, to the point where it may be applied to a large variety of bulk grain storages including silo bins, Butler bins, converted oil tanks, and Quonset-type flat storage bins or airplane hangers. All, of course, must be well sealed.

It is no longer necessary to be totally in the dark to what is happening inside a tarp or fumigating chamber or fumigated structure when using methyl bromide, entomologist Norman R. Ehmann announced in a paper prepared with Karl M. Hassler both of Neil A. Maclean Co., Los Angeles. The development of the thermal conductivity principle of rapid and fairly precise measurement of gas concentrations used in the Gow-Mac Gas Master and the Fumiscope measuring devices, makes it possible to obtain sufficient data at the site of a fumigation by a practical fumigator in time to understand what is happening, while it is happening.

Fumigation is peculiarly suited to grain protection, he observed, but there has been a need to have precise and scientific methods to apply and properly measure the effectiveness of the fumigant. The two new measuring devices promise a way to get the information needed.

Most grain fumigants used in farm bins, according to Glen Lehker, Purdue's extension entomologist, are the basic 20-80 or 75-25 mixtures with or without ethylene dibromide and/or sulphur dioxide. The 20-80 mixture contains 20% carbon bisulphide and 80% carbon tetrachloride, while the 75-25 formulation is made up of 75% ethylene dichloride and 25% carbon tetrachloride. When ethylene dibromide or sulphur dioxide are added, the former usually amounts to 5% and the latter 3%.

A chart giving the amount of fumigant needed per 100 bushels of grain is shown here as Lehker gave it.

Successful fumigation, Lehker reported, depends on **1.** tight containers, **2.** adequate temperature (between 60° and 70°F.), **3.** using sufficient fumigant, **4.** even distri-

Amount of Fumigant Needed per 1000 Bushels

	Wooden Bins	Steel Bins
a. 75-25 mixture (wheat)	8 gals.	4 gals.
b. 72-25 mixture (corn)	8 gals.	6 gals.
c. 20-80 mixture (wheat)	4 gals.	2 gals.
d. 20-80 mixture (corn)	6 gals.	5 gals.
e. *65-27-5-3 mixture (wheat)	4 gals.	2 gals.
f. *65-27-5-3 mixture (corn)	8 gals.	5 gals.

* 65% ethylene dichloride, 27% carbon tetachloride, 5% ethylene dibromide, 3% sulphur dioxide.

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Dramatizing (in top photo) two mice could deposit one and a half gallons of urine on cereal grains is **Walter Weber** (left), of Indiana Farm Bureau, and **James I. Herring,** Chicago Food & Drug Administration office.

Conferees learned life history, habits and laboratory identification of grain insects from Purdue professors **George E. Gould** (at left in middle photo) and **Howard O. Deay.**

Chemical control of grain pests was discussed by **J. Larry Maxwell,** of The Dow Chemical Co., and **Glen Lehker,** Purdue extension entomologist. Here Mr. Maxwell (left) explains the new "forced recirculation" method for methyl bromide in large converted oil tanks.

bution of fumigant, **5.** low wind velocity, and **6.** level grain that is below the top of bin walls. To obtain even distribution of the fumigant, any crusting on the surface of the grain must be broken. Fumigant must then be spread evenly over the leveled-off grain. The main reason for failures in fumigation, he said, come from disregard of one or all of these factors.

• Sprays, Protective Powders

Sprays for grain bins and storage areas recommended by this Purdue extension specialist are 2.5% DDT which gives the longest residual protection, but the most objectionable residual, 2.5% Methoxychlor, 2.5% TDE, 0.5% Pyrethrum or Allethrin, and Pyrenone at manufacturers' directions. One gallon per 250 sq. ft. is usually required for wooden bins, but double that quantity for metal bins, sprayed to run-off point.

The following grain protectants were suggested:

a. Pyrenone powders (pyrethrum plus piperonyl butoxide plus carrier) at 75 pounds per 1000 bushels of wheat.

b. Pyrenone emulsion (pyrethrins plus 60% piperonyl butoxide diluted with water and mixed 1 to 29 to give 2%) applied at 5 gals per 1000 bushels.

c. Pyrenone solutions (pyrethrins plus piperonyl butoxide plus tetra chloroethylene) used without dilution.

Important in Purdue's coverage of the grain insect problem were the life history and habits and laboratory identification sessions conducted by entomology professors George E. Gould and Dr. Howard O. Deay.

• Bird Control Pro and Con

"Biggest problem in effective bird control is public relations," W. D. Fitzwater told delegates. This assistant district agent of the U. S. Fish & Wildlife Service headquartered at Purdue, said there are many plus and minus values to birds, but sparrows, pigeons, starlings and native blackbirds need to be controlled nonetheless.

On the "plus" side, Fitzwater admitted no one can question the aesthetic value of birds. They are used for food and sport, their guano is useful in some instances, and perhaps they do destroy some weeds. However, their value in dispersing seeds is questionable, and as insect controllers, they are "vastly overrated."

Tipping the scale with reasons why noxious birds should be controlled, Fitzwater emphasized the urban filth they cause, their contamination of food, cause of crop damage, their hindrance of forest growth by eating seed, their disease dissemination particularly in poultry, their predation on livestock, and the ectoparasites and insects carried by all birds.

There still isn't an effective fool-proof control technique, this expert admitted, but several methods have given temporary control.

Sight-scare devices, such as a two-faced aluminum owl, scarecrows, colored twisted metal strip whirlers, and strips of white cloth have worked until birds get used to them. A yellow, rotating beacon light scares them for awhile.

Fireworks have worked in some instances. One Fitzwater has had success with is "Caw-Caw" Fuse Rope, an 8-hour, slow-burning fuse spaced with fire crackers.

Mechanical repellents such as electro-sensitizing devices and the wire mesh installation available from Nixalite have their place.

Poisons, which cannot be officially recommended because of humane society restrictions, do the trick where they are permitted. Various forms of strychnine, either as a sulfate powder, alkaloid, or in crystals, are effective, but care must be taken to watch for secondary poisoning hazards. Thallium sulfate at 5% has worked, too, but it is slower acting, taking from 12 to 72 hours to accomplish its purpose.

Of all the various types of pigeon traps which have been proposed, Fitzwater still prefers the bob-trap door type described by Dr. E. R. Kalmbach in **Pest Control,** May '54, page 10.

One of the newer control methods employs a tape recording of distress calls. Fitzwater reports this is more effective with starlings than for pigeons and that he has had several successful controls with such a method. (See **Pest Control,** Aug. '55, page 52). All that is needed is a tape recorder, an amplifier, oscillator, and a tape recording of the distress calls. Fitzwater announced that patent protection for the tape system has been refused by Washington, enabling anyone to use this method.

• Bird Repellents

Pigeons, sparrows, starlings, gulls, etc., can be effectively repelled by paste- or grease-like compounds now on the market. So said A. W. Burr of Burr Chemical Co., Rockford, Ill.

Such repellents are said to be humane, safe to use because they are not a poison, and easy and economical to apply. And the market for such applications by PCOs includes churches, office buildings, hospitals, banks, factories, grain elevators, in fact any building damaged or annoyed by birds.

Application of such compounds should be made on all ledges, elbows, and eaves to be 100% effective. And, if an application of a silicon water repellent is put down prior to applying the bird repellent, there is not only less chance for staining, but life of the repellent is also extended because absorption of oils is reduced.

One delegate reported he found Titron-X, that can be purchased from most paint or hardware sup-

ply stores, is useful in place of gasoline for removing paste-like bird repellent material.

Mr. Burr demonstrated how such bird repellents should be applied, one-inch from the ledge in a rather thick rope-like line, and then another wavy-type line a few inches father back if ledge area requires it.

• Rodenticides Compared

Speaking both on the status of anticoagulant rodenticides and bait placement was Galen C. Oderkirk, Fish & Wildlife Service district agent, located in Lafayette. Among the several charts he showed was this one which created much interest because it reveals how effectiveness of kill is in reverse proportion to the safety of common rat poisons.

Theoretical Potential Kill of One Pound of Poisoned Bait
(average weight of rats 250 grams)

1.5% Thallium sulfate or micronized arsenic trioxide	
25 Mgs. per kg.	1088 rats
.22% Sodium Fluoroacetate (1080)	
5 Mgs. per kg.	797 rats
3% Arsenic trioxide (regular)	
100 Mgs. per kg.	544 rats
10% Red Squill	
500 Mgs. per kg.	362 rats
.025% Anticoagulants	
2.5 Mgs. per kg. - 4 days	45 rats

Oderkirk reported his tests have shown .025% concentrations of warfarin, pival, and fumarin all appear to be equally effective in good, fresh baits. He also said fumarin seems to have less deviation in kill-time and may be slightly more effective for mice control.

Six "things to be particular about" in bait placement urged by the speaker are: **1.** select choice, fresh foods for your poisoned baits, **2.** use the poison that is best suited for the place the poisoned bait will be used, **3.** use only fresh baits, **4.** be careful to have the correct amount of poison in your bait mixture, don't guess!, **5.** place baits, where possible, under protective cover so that only rats and mice will get them, and **6.** before exposing poisoned baits, check for the presence of domestic animals, children and irresponsible adults.

• Bait Mixtures

"An improperly mixed bait will kill some rats. It will also make some of them ill. Rats that have been made sick by eating an improperly mixed bait (not getting enough of the poison to kil them) become bait shy and are hard to kill with any poison." Those words of warning were spoken by E. F. Sennewald of Sennewald Drug Co., St. Louis, Mo. "If the bait is not properly mixed, no matter how attractive it is, or how well it is placed, or which poison is used, your results will not be good."

While demonstrating proper bait mixing procedures, chemist Sennewald gave the following list of ingredients for 10 pounds of an anticoagulant bait:

8 ounces of anticoagulant
8 ounces of powdered sugar
8½ pounds of yellow corn meal
8 ounces of corn oil

First mix the anticoagulant and powdered sugar together very thoroughly in something like a mixing bowl. Then add the corn meal in small quantites, about a pound at a time, stir and mix well after every addition until all of the meal has been added. Then dribble-in the corn oil to the above mixture in very small quantities, stirring and mixing well until it is all in.

As an extra warning on the proper mixing of rodent baits, Sennewald emphasized the necessity of discoloration to make them less attractive in appearance. "If it smells good, and tastes good, and is mixed well, that's all that is necessary to get results. A bait doesn't have to look attractive to be effective."

• Rat Motivation

Hunger, fear, anger, individual dominance, curiosity and cooperation all influence behavior characteristics of rats and their acceptance of baits, Dr. Harlan R. Shuyler of Conservation Industries in Kansas City, Kans., reported, taking his material from his research project at Purdue several years ago.

Environment and other factors, too, influence bait acceptance. Among them are the abundance and kinds of food available, the presence of enemies, including man, and new object reaction which brings out shyness and timidity. Rats can develop not only bait shyness, but poison shyness, and even a combination of both bait and poison shyness, Shuyler said. Weather, too, has its effect. He noted bait acceptance is usually reduced in early stages of cold weather; that precipitation and storms seem to decrease acceptance, and that in the period from summer to fall acceptance was observed to drop off during his Purdue rodent bait project.

Prior treatments by other PCOs must be taken into consideration. How often has each type of poison been used? What poisons were used? What were the results? These are the questions you must ask yourself, Shuyler advised, to guide you in your own applications.

• Raccoon Termite Detector

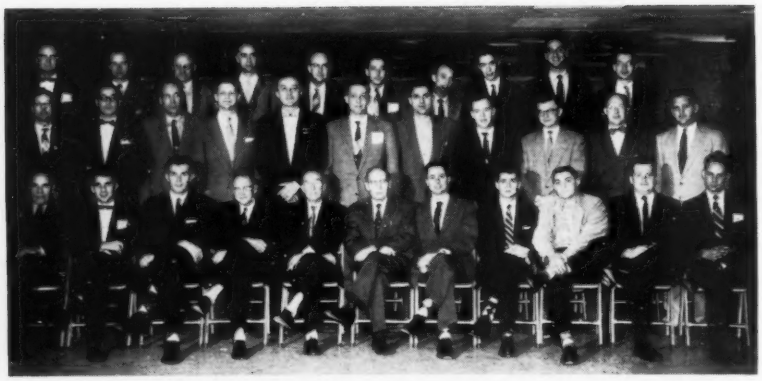
Termite operators pricked up their ears when Prof. John Osmun reported an instance in southern Indiana where a raccoon had been let loose in a house in which it had been difficult to accurately locate termites known to be present. Sure enough, the raccoon began gnawing at places along inside walls where termites were discovered.

Osmun was quick to negate any endorsement of this detection technique, but did use that illustration to emphasize the necessity for thoroughly and accurately

A. W. Burr (left), of Burr Chemical Co., and **W. D. Fitzwater,** Fish and Wildlife Service agent (top photo), gave delegates data on bird control. Here Mr. Burr demonstrates two ways to apply bird repellent pastes.

Insect resistance anyone? **Jack Keller,** in charge of the USDA's household insect investigations lab at Orlando, Fla. (center photo left), provided list of chemicals he's found give good control of resistant flies, roaches, mosquitoes and fleas. **Dr. C. W. Kearns,** outstanding researcher into the causes of insect resistance, predicted insects will become resistant to all present-day pesticides and probably to future new ones.

Infestation sources and preventive methods for grain insects were the topics covered by Washington USDA-man, **Dr. Lyman S. Henderson** (left in bottom photograph), and PCO **Lee Truman,** of Indianapolis, Indiana.



Some 30 Purdue entomology graduates who are now in the pest control business, and members of the entomology department, honored department head, John June Davis, fifth from left in front row, at dinner in downtown Lafayette during 20th PCO Conference, Jan. 30-Feb. 3.

making inspections for termites.

Stressing also the need for knowledge of termite biology, this educator who is writing his doctorate thesis on one phase of termite control, told his audience one colony may have several dozen queens. They may be of three types: primary or Macropterous queens that have large wings; secondary or Brachypterous queens with small wings; and tertiary or Apterous queens with no wings.

It takes from five to seven years before a new colony really becomes serious, Osmun reported, and such environmental factors as light and humidity influence their development. Termites prefer 90% humidity and they can control the extent of their own humidity by plugging holes that let in too much air, or make new holes if drying is required for their comfort. The thesis that termites always shun light for no other reason than they just don't like light appears to be false. They only avoid light apparently because of its effect on humidity. if the proper level of humidity could be maintained, termites would not shun light, Osmun believes.

• Pricing Termite Jobs

Differences of standards, methods, and utilization of labor have resulted in wide price variations on termite jobs. Past NPCA president in charge of the Rose Exterminator Co. in Cincinnati, Ohio, Robert C. Yeager, discussed the plan upon which he bases his bids.

First of all, he said, he had to establish a fair hourly return which includes normal use of materials, labor, overhead and profit. One suggestion from the floor was that such an hourly rate can be roughly determined by taking three times the labor rate you pay.

Next, Yeager continued, acquaint yourself with the time involved in each operation such as cutting openings, tunneling, trenching, drilling, corrective measures, treating, length of guarantee, etc.

Then make a drawing of the building to be treated to indicate areas of infestation, type of construction, unexcavated areas, wood partitions and what is to be done about them, areas to be drilled, trenched, etc.

Divide the job into work units making adjustments for irregularities such as distance, extra materials, overtime hours, etc.

Finally, apply the hourly rate to the number of hours involved and "you have your price," Mr. Yeager explained. But in an example given delegates to bid on, pricing techniques must have been as different as the better than 200 in the room, for quotations ranged from $123 to $717, with the average and mean close to $375.

• On the Waterfront

Decay in waterfront structures is a major problem of the navy and for many buildings fronting on water throughout the country. That's why Arlo E. Thomas, supervising entomologist for the 11th Naval District, was invited to talk to PCOs. Although termites and other wood borers are significant destroyers, the navy's biggest problem is with fungi.

Ideally, the optimum temperature for wood is 80°F., but wood that has less than 20% moisture content or is above saturation, will inhibit fungi development.

It was the speaker's opinion that when all other factors are equal, the method of wood preservative application should have the following effect on life expectancy:

If untreated wood has an expected life of	1 unit*
Light brush or spray	1 to 1½ unit
Thorough brush or spray (saturation 2-3 times)	2 to 3 units
3-minute cold dip treatment	3 to 5 units
Hot and cold (partial vacuum) dip	4 to 7 units
Pressure treating	10 to 15 units

* Unit represents any given period of time.

The Chapman Chemical Co., 707 Dermon Building, Memphis, Tenn., maintains stocks of all specifications relating to wood preservation, including TT-W 571c which the government follows, and will mail them to anyone requesting copies.

• Who Runs Your Business?

Business and marketing aspects of pest control operations were explored by Dr. Harvey W. Huegy, head of the marketing department in the College of Commerce at the University of Illinois.

"Will you run your business or will it run you?" he asked. The answer he said comes when you ignore professional business skills, when you regard them as beneath your dignity; then the business runs you.

"You are professionals," he said to the PCOs, "and want to maintain high professional standards, but attaining professional standards of business operations requires you to recognize that the business end of your operation is just as important as the technical."

• Resistance of Any Insect To Any Chemical

A prediction of Dr. Edward F. Knipling, chief of the USDA's entomology research branch, gave conferees little encouragement that the answer to insect resistance of present-day chemicals is anywhere in sight. He, and Dr. Clyde W. Kearns, research entomologist from the University of Illinois, who is widely renowned for his investigations into the causes of insect resistance, confirmed statements that it appears any insect can become resistant to any pesticide that will be developed to control it.

• But These Are Working

More promising to PCOs faced with the dilemma of insect tolerance to their chemical tools, were the alternate methods of control provided by Jack C. Keller who is in charge of household insect investigations at the USDA's Orlando, Florida laboratory.

For resistant houseflies, the following residual treatments give indicated measure of control:

Diazinon: 1% to 2% wettable powder or emulsion applied to run-off (50-100 mg. per sq. ft.) gives one to

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LOOK TO POWELL . . . FOR CONSISTENT, TROUBLE-FREE QUALITY

Professor John V. Osmun, in charge of the 4-year PCO cpurse at Purdue, and his wife Dorothy, admire the plaque presented him by NPCA during the conference to certify his election to its honorary membership.

19 weeks' control. The farther north, the better the control.

Malathion: 1.25% to 2.5% wettable powder or emulsion applied to run-off (60-125 mg. per sq. ft.) provides one to six weeks' control.

Chlorthion: 0.5% to 2.5% emulsion applied to run-off (25 to 125 mg. per sq. ft.) gives three days' to seven weeks' control.

American Cyanamid 4124: 1% to 2% emulsion or wettable powder applied to run-off (50-100 mg. per sq. ft.) gives two to seven weeks' control.

Chlorthion and American Cyanamid 4124 are not commercially available at this time.

These space sprays and aerosols are giving some control:

Synergized pyrethrins: (1) 0.1% pyrethrins plus 0.8% to 1% synergist as sprays, or (2) 0.4% pyrethrins plus 1% to 4% synergist as aerosols.

Synergized allethrin: 0.6% plus 2% synergist as aerosols.

Here are the chemicals Keller gave that are effective for residual treatments to control resistant cockroaches:

Malathion: 1% to 2% as spot treatments gives from 21 to 58 days' control with an average of 45 days.

Diazinon: 0.5% to 2% as spot treatments provides from 26 to 62 days' control, with an average of 41 days.

Dipterex: 1% to 2% as spot treatments is giving an average of 44 days' control with the range spreading between 34 to 59 days.

American Cyanamid 4124: 2% as spot treatments, showing six to 56 days' control, with an average of 31.

Chlorthion: 2% as spot treatments gixes from six to 36 days' control, with the average being 26 days.

Sodium fluoride 98.9%, pyrethrins 0.1%, piperonyl butoxide 1%: spot treatments of this combination are effective until moistened, and give from 26 to 57 days' control, with an average of 44 days in Florida. Results should probably be better in less humid sections of the country, Keller observed.

• What's Wrong With Powders?

With the failure of some chemicals to control resistant roaches, oldtimers are using powders once again. But to many who have become PCOs since the days of DDT, proper procedures for applying roach powder are entirely foreign.

Albert M. Akers, in charge of the Rose Exterminator Co., Cleveland, Ohio, office, has continued to use powder as a supplemental control measure all through the days of "wonder" insecticides and was especially well equipped to demonstrate sodium fluoride application to the jam-packed room which bulged with delegates eager to hear his instructions.

First of all, he said, you'll need a simple mouth mask. Powders are sometimes dusty and you shouldn't inhale them. But "dusting" can be reduced if you remember that powder does not need to be applied "knee deep"!

For shelves and other areas where the powder is not to be seen, attach a 3 foot piece of small rubber hose to a large rubber bulb, and at the other end connect a small piece of 1/8" aluminum tubing that has been flattened on the "nozzle" end. Squeeze the bulb gently and the powder will mist ever so thinly. The same hose and bulb arrangement will work for putting powders under ledges.

• Honor Conference Founder

As in the last 20 years, Professor J. J. Davis, Purdue's chief in entomology and conference chairman, had carefully arranged the entertainment program for the conclave's annual banquet held in the school's Union Club building. But this year, unbeknowst to him, a special ceremony was planned to honor his retirement on July 1.

Seven National Pest Control Association past presidents were on hand for it has been through J. J. Davis that the NPCA was stimulated into an educational program for its members. Each of them paid special tribute with a short address. Dr. Ralph E. Heal, association executive secretary, announced that his executive board voted they would like Professor Davis to become a consultant to the NPCA president and have offered him that position.

Current association president, I. B. Carncross, presented the entomology chief a beautifully bound leather booklet of over 150 letters from some of his industry friends. Senior ranking NPCA past president, C. Norman Dold, handed the conference chairman a hand-lettered, illuminated scroll mounted in wood and faced with clear plastic, the scroll spelling out the NPCA's appreciation for the better than 20 years of service Professor Davis has given the pest control industry.

Frank K. Harder (at left), and **William L. Brehm** (center), two Purdue entomology graduates who are now PCOs, presented their retiring professor, **John June Davis,** with traveling case and luggage from former students at special banquet on night prior to opening of this year's PCO conference.

Friends from all over the industry had pooled contributions to buy a 24" RCA console television set which Robert C. Yeager unveiled for Professor and Mrs. Davis at the banquet. Response to the request for funds was so great that a check for the difference over the cost of the TV set was also presented the Davises.

Dr. Kenneth McFarland, education consultant for General Motors Corporation, gave the featured address which also praised J. J. Davis' accomplishments.

• Former Students Exalt Their "Ent" Professor

Some 30 of his former entomology students now in commercial pest control paid tribute to Professor Davis with a banquet held Sunday night before the conference got underway. Meeting in Marchall's restaurant in Lafayette, the group presented their teacher with initialled leather luggage and a fitted traveling case. Keynote speakers for this affair were William L. Brehm, of Hygienic Sanitation Co., and Frank K. Harder, Harder Exterminating Co., both of the class of '50 who had been residents in the Davis household during their college days.

Members of the Purdue Entomology Department teaching staff joined with grads in this first of a series of week-long observances of Professor Davis' retirement. Youngest PCO present was Fred Diehl, '54, Diehl Pest Control, while the oldest practicing operator at the banquet was Charles Partlow, '35, owner of Reliable Exterminating Co., in Lafayette.

At both this student banquet, and the one held Thursday even-

(Continued on page 59)

CHAPMAN

MARCH IS THE MONTH FOR . . .

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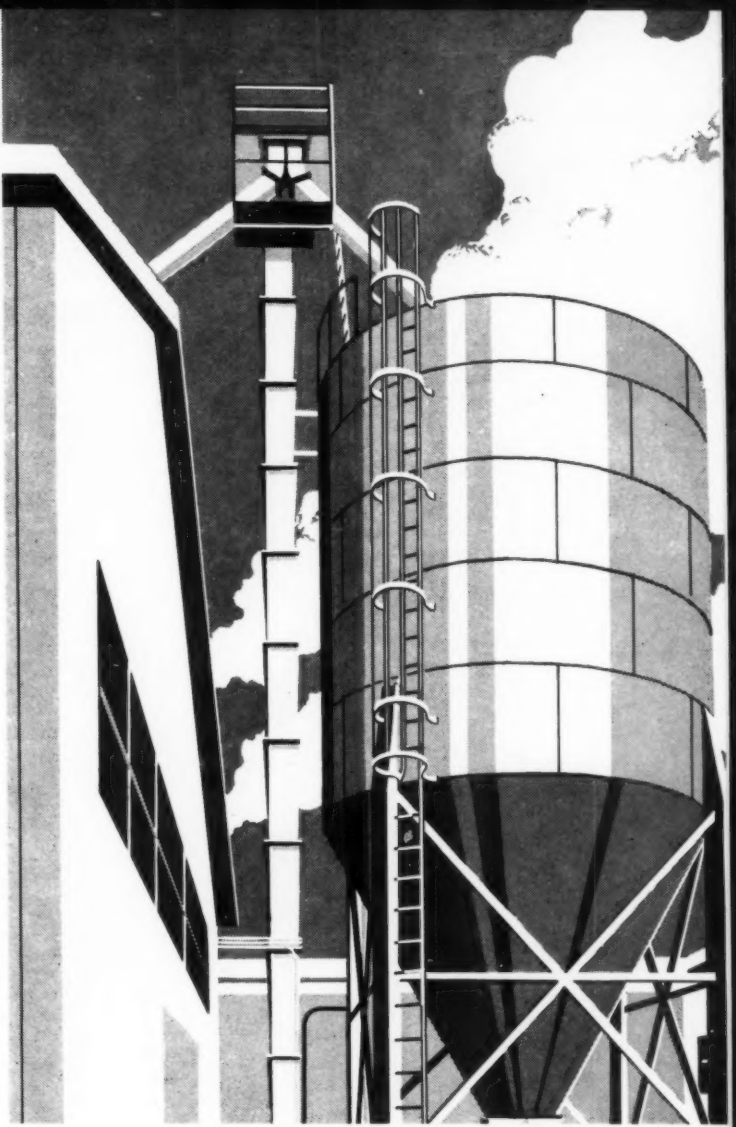
DIELDREC—Emulsifiable Dieldrin for termite and general pest control . . . used also for oil dilution. 55, 30 and 5 gallon drums.



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If you do not have your copy of Chapman's "BUYER'S GUIDE AND HANDBOOK" of technical information, and Chapman's "PCO PROMOTION PLAN" to get new business, write today to Chapman Chemical Company, Memphis, Tennessee.

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"Buy Now, Pay Later" Pest Control Suggested to 125 Dixie Operators Attending '56 Southern Conference

Would a deferred payment plan for pest control and termite control services be as practical and successful as it has been for numerous industries such as home repair, retail sales and travel agencies?

"Emphatically, yes," certified public accountant, Irving Himes, of Memphis, Tenn., told the more than 125 pest control operators and representatives of allied industries who attended this year's Southern Pest Control Operators' Conference held at Louisiana State University, Baton Rouge, January 30-February 1.

"Such a PCO credit plan might very well 'drum-up' a lot of new business for this industry." Mr. Himes, who operates his own accounting firm, said he was convinced PCOs could convert slack business periods into real "money making seasons" by adopting this practice.

"The chance of loss from bad debts by extending credit is very small," he pointed out. "And PCOs could require a down payment that would cover the basic costs of labor and material."

During the three-day meeting, attending operators from the Deep South also heard talks on the National Pest Control Association's Serviceman's Manual, role of the pest control operator in disaster areas, new chemicals, advertising, ant control, legislation, rodent control, industrial fumigation, roach resistance and termite control.

Continuing his talk on "It Costs To Do Business," Mr. Himes called on PCOs to utilize the services of professional accountants. "The operator and his accountant can sit down to determine these four basic factors for operating a successful business: (1) What have we done? (2) What are we doing? (3) What will we do? (4) What will be the consequences in the future if we do such and such?

"However, many PCOs call in the CPA after the damage has been done. Basically an accountant's service should be used from a preventive approach rather than a curative one.

"It is very important to analyze sales activities by months," he went on. "Your operating statement should show the dollar increase in sales, but more important, the reasons for the increase such as new accounts, loss of old accounts and what brought in the new accounts."

• TV "Spot" Advertising

"Television can be one of the most effective advertising mediums for the pest control operator," agency account executive Lee Herzburg, of Herbert S. Benjamin Associates, Baton Rouge, predicted. "Spot commercials between breaks are low in cost but big in value.

"And you have a wonderful 'sales pitch' to make in that pest control increases sanitary standards and guards health. A good advertising program is something no progressive pest control firm can afford to be without."

During another session, Dr. Ralph E. Heal, National Pest Control Assn. executive secretary, explained how to use the NPCA's Serviceman's Manual.

"The manual has two chief aims," Dr. Heal said: "(1) To put useful information into the hands of the serviceman; and (2) to instill in him pride in his job, a sense of responsibility to the public, and loyalty and allegiance to the employing firm."

Here's how Dr. Heal said to use the manual. First, be familiar with it yourself. Second, make it available to the serviceman. Third, help him understand it.

• Disaster Pest Control

"Insect and rodent problems are always magnified following disasters," NPCA president, I. B. Carncross, said as he took up the subject, "Role of the Pest Control Industry in Disaster Areas."

Mr. Carncross continued by emphasizing the following pests must be held in check following such a holocaust.

Flies: Breed in tremendous quantities. Important as both a nuisance and as a carrier of disease.

Body Pests: Fleas, lice, bed bugs, etc., are most important as a nuisance factor although they

Eight Dixieland states were represented by the 125 PCOs attending the 1956 Southern Conference at Baton Rouge, La.

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Arwell announces a NEW, improved Rat-Mouse Feeder packed with Exclusive Features for Safer, Easier Control

For years, Arwell Protect-O-Bait Feeders have been used by scores of P.C.O.'s from coast-to-coast. Now, Arwell brings the industry its new version of a sturdier, safer, and more versatile rat-mouse feeder . . . a bait box that's been field tested by more than 200 servicemen. Its new, tamper-proof lock lid means greater protection. Its tougher, more rugged construction means longer life. It takes both liquid poison and dry baits. It's your perfect answer for safer placement of rodenticides, a good selling point for your customers, too.

Try to Beat this Low Price . . .

only 63¢ each

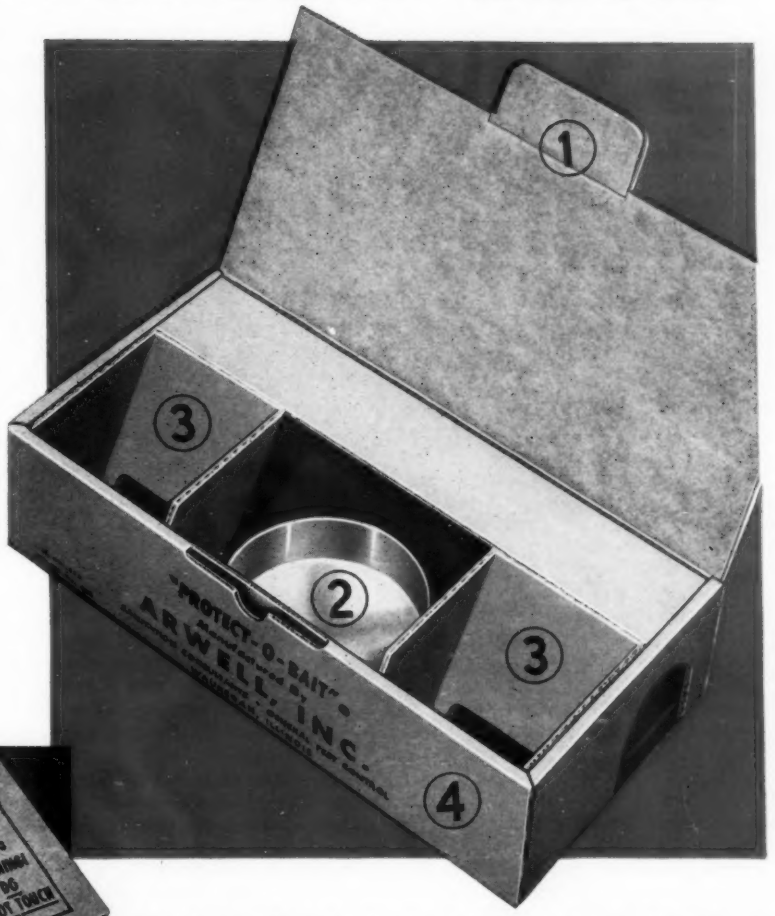
IN LOTS OF 96

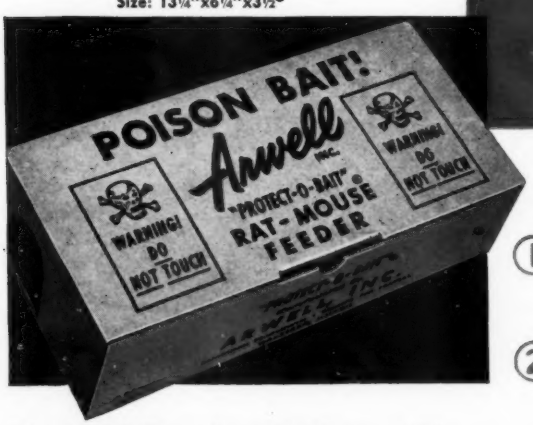
Lots of 48...65¢ each Lots of 24...70¢ each

Packed 24 boxes to a carton

[Minimum order—one (1) carton]

Size: 13¼"x6¼"x3½"





No other Rodent Feeder has all these Practical Features!

1. **Self Locking Lid-Tab** . . . discourages tampering with baits. Safety lock-tab holds lid securely in place . . . only an experienced serviceman can open lid-tab easily. Thus, tampering is discouraged.
2. **Rust-Resistant Metal Cup** . . . for liquid poisons. Cup holds eight ounces of poison . . . is firmly anchored in box . . . can't tip. Treated with special rust preventive paint.
3. **Automatic Feeding Bait Hoppers** . . . each holding ½ pound dry bait. Recessed feeding areas prevent scattering of bait . . . makes bait more accessible to rodents.
4. **Rigidly Constructed Box** . . . built for long, hard usage . . . able to withstand jars and jolts. Designed to slide under storage pallets. Easy to assemble. 2⅜" x 2" entryways plenty large for rats.

Big, Bold Warning Notice on Lid... You Can Even Use Your Name!

When you use Arwell Protect-O-Bait boxes you provide best possible warning to everyone on your customer's premises. You can paste your name over the Arwell Trade Mark. Many P.C.O.'s do this.

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☐ 48 PROTECT-O-BAIT FEEDERS @ .65 ea. $_____

☐ 96 PROTECT-O-BAIT FEEDERS @ .63 ea. $_____

All Shipments F.O.B., Waukegan, Illinois

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☐ Send C.O.D. ☐ Check or M.O. Enclosed

could contribute to spreading disease.

Mosquitoes: Breed in great numbers. Primarily an annoyance but can carry disease.

Ticks and Chiggers: Can spread disease but primarily an annoyance. Bites can be painful and cause secondary infection.

Rodents: Important from both the standpoint of disease and contamination.

Communities should set up emergency stand-by pest control units in case disaster strikes, Mr. Carneross said. For maximum effectiveness PCOs must have enough available men to carry out control procedures, an equipment pool, and identification cards and passes so each operator can get into contaminated areas.

• Roach Chemicals Evaluated

At another conference session, Dr. Ralph E. Heal again stepped to the rostrum to bring PCOs the latest word on roach chemicals.

"Some PCOs are getting successful control of resistant German roaches with Malrin, while others find malathion is just as good," Dr. Heal said. "We don't know whether Malrin is better than malathion or not.

"In certain areas, malathion is not controlling the American roach too well. In these cases, many PCOs are mixing malathion with chlordane and getting pretty good results."

As far as malathion's odor is concerned, Dr. Heal said it is sometimes better to use the chemical and have a stench for one day than to use a deodorant and have an unpleasant smell for two weeks.

Switching to Dipterex, Dr. Heal said there would not be a formulation on the market suitable for roach control this year.

"Diazinon use is moving into a new phase," Dr. Heal continued. "It appears Diazinon may be better as a roach control chemical and give a better residual than malathion."

The Communicable Disease Center feels Diazinon ½% emulsion can be applied indoors on a spot treatment basis for resistant German roaches without endangering occupants, according to Dr. Heal. (Just before press time the Department of Agriculture granted Diazinon label acceptance as a spot treatment for roaches indoors.)

The NPCA recommends that extra precautions be taken with Diazinon. If it is applied under conditions that give off mist, it is suggested a mask, breathing apparatus and protective clothing be used. Also employ solvent resistant gloves.

"When using sodium fluoride, be sure you get the same chemical that has been so successful in the past," Dr. Heal cautioned. "Make certain the particle size is fine. In other words, don't use any amorphous diluents. (Particles that are soft to round with no jagged edges.) Use something crystal, sharp and hard."

Business sessions at this year's meeting were punctuated by "coffee breaks." Here, **R. L. Showalter** (center), Texas PCA executive secretary, talks over a control problem with Virginia Smelting Co. representatives, **William G. Hart** (left), Portsmouth, Va., and **Paul A. Nelson**, Atlanta, Ga., outside door to "coffee room."

• Imported Fire Ant Control

"A serious pest in the southern states today is the imported fire ant," Kirby L. Cockerham, extension entomologist at LSU reported. Mr. Cockerham said this ant first entered the United States at Mobile, Ala., in the late 1920's. Today the marauder is distributed over 10 southern states from North Carolina to Texas.

"Locally, distribution of the imported fire ant is by flight," Mr. Cockerham continued. However, in every case where a new community has been infested it can be traced to the shipment of balled nursery stock.

"Chlordane, dieldrin and aldrin all give control, he said. An application of four pounds of technical chlordane per acre or two pounds of dieldrin or aldrin per acre, either as a dust or spray, gives control for two years. When using as a spray, mix 50 gallons of water with the per acre requirement."

However, Mr. Cockerham recommended that when an area around parks and playgrounds is to be treated only half this quantity of insecticide should be used because of the potential danger to humans. This rate of application will give control for one season.

When treating ant hills, Mr. Cockerham said, put three gallons of dilute chlordane directly into the hill. In addition, it's best to treat the area around the hill so no ants which could start new colonies are missed.

• Legislation by States

During one evening session, a seven-man panel representing the states which have PCO legislation discussed the pros and cons of pest control laws. Here is the breakdown by states of what each panel member thinks of legislation in his own particular area:

Alabama: J. O. Honeycutt, Orkin Exterminating Co., Birmingham. "Alabama has had a pest control law since 1939. An operator must be able to pass a written examination before he can practice. But the examination is very simple and the state cannot refuse a license to anyone who passes the test and obtains a bond."

Arkansas: Donald E. Anderson, Evans Laboratory, Little Rock. "Arkansas' basic pest control act was passed in 1939. The law is administered by the State Plant Board which conducts examinations and issues licenses. The board also checks the quality of workmanship on termite jobs. As far as the pest control operator is concerned the law is just an additional worry."

Florida: F. Peter Clements, Clements' Services, Ft. Lauderdale. "The Florida Act was first passed in 1947 and amended in 1955. This is difficult to work with because it stifles business expansion. I believe some sort of model, universal legislation should be worked out."

Georgia: Theodore Oser, Orkin Exterminating Co., Atlanta. "The Georgia law is the newest of the 12 states which presently have legislation since it took effect in October 15, 1955. Presently, we are trying to amend this act so a public hearing will be held for any change in legislation. All operators from now on must pass a state examination. However, those in business prior to last July are exempt from the examination due to a 'Grandfather Clause' included in the law."

Louisiana: Dr. C. E. Smith, state entomologist, Baton Rouge. "The Louisiana pest control act was first passed in 1942 and amended in 1954. There is a five man pest control commission representing two from the industry, one from LSU's entomology department, the state entomologist

and the state Director of Agriculture. Every operator in the state must take an examination to be licensed. The commission may revoke an operator's license by a unanimous vote after just cause is shown. A $5 fee is charged for every termite contract to pay for administration of the law."

Mississippi: A. H. Jackson, Superior Termite Control Co., Jackson. "The state law was passed in 1938. It is governed by the State Plant Board. Licenses are easy to get and no fee is charged operators to support the program. The state has 19 part time inspectors who check and report violations or sub-par-work. TOs have 30 days to correct a reinfestation after the state inspector registers a complaint."

Tennessee: Myron W. Smith, Hill-Smith Termite Control Co., Memphis. "Tennessee's original pest control law was passed in 1947 and amended in 1955. A pest control board administers the act and conducts examinations for licensing. A $3 tax has to be paid to the state for each termite contract. The termite control industry carries the whole cost for administration of the law. Even though a man passes the examination he can still be denied a license if the board decides he is not of 'good moral character.'"

Although attending operators were divided in their opinions about the value of state pest control legislation, the general consensus of opinion was that they would rather have a pest control law on the books, even though inadequate, than no law at all.

"It takes 2 billion, 500 million pounds of food to feed rats in the United States each year," reported Fish and Wildlife Service district agent, R. B. Deen, of State College, Miss. "And, furthermore, they contaminate 10 times as much as they eat.

"No rat poison is universally effective. Most have one or more shortcomings in: acceptance, taste, odor, tolerance. Also remember, that the rat's sex sometimes determines the rodenticide's effectiveness.

"Anticoagulant poisons must be taken daily over a period of time as opposed to single dose compounds. Animals, apparently do not associate the cumulative effect of internal hemorrhaging with their food supply and thus return to feed on anticoagulant baits again and again. Bait shyness therefore, is largely overcome and at the same time, hazards to other animals from single accidental feedings are greatly reduced.

"New anticoagulants that have been recently evaluated in the field are PMP and PMP-P in the liquid and dry bait forms. The tests were made on individual premises and area-wide basis, under a variety of weather and environmental conditions. Excellent control of Norway rats, roof rats, and house mice was obtained in the experimental trials."

Frank Birch (left), who journeyed all the way from Edmonton, Alberta, Canada, for the meeting, and **Sidney Salvant**, U. S. Naval Station, New Orleans; watch B & G Co. representative, **Clayton Wright** demonstrate a piece of equipment. In background is **Charles Reeves**, of Public Health Equipment Co., San Antonio, Tex.

Mr. Deen had this parting shot for PCOs. "No value accrues from raising established poison levels. Acceptance is usually decreased and hazards are increased. It is also a needless expense to the operator."

• Six Rodent Signs

Carrying on the rodent theme, C. B. Treadway, Orkin Exterminating Co., Jackson, Miss., told operators there are six principal rodent signs to look for when making an inspection: (1) harborages, (2) gnawings, (3) damage, (4) droppings, (5) odors, and (6) wall marks.

"An experienced PCO should be able to tell from the droppings alone what species is involved, newness and extent of the infestation."

Damage is the primary reason people want to get rid of rats, Mr. Treadway continued. "However, we should go beyond the simple poisoning of rats to provide environmental control as well."

• Fumigation With Tarps

"In many types of fumigation jobs you can do a better job by sealing off the building with tarps," Orkin's technical director, R. M. Russell, said.

However this type of operation also entails at least three disadvantages. First, is the cost of the tarps themselves and such equipment as clamps, ladders, etc. Orkin estimates it costs $5,000 to fumigate structures up to 40,000 cubic feet.

Second, skilled or semi-skilled labor is needed for fumigation. And the men must have great physical stamina as well.

Third, is the risk involved. Men must work at high altitudes in awkward positions. There's also a greater chance to damage property.

Here's the five-step procedure for fumigating buildings enclosed in tarps:

1. **Survey**: Determine number of tarps needed and most economical way to put them up.
2. **Preparation**: Remove wires, shrubs, flowers, TV aerials, etc. from building.
3. **Padding**: Cover all loose edges, nails sticking out or anything else that could damage a tarp.
4. **Tarp Placement**: Place tarp most economically and efficiently, set clamps, and weight bottom with sandbags.
5. **Distribution of Gas.**

After the job has been done, Mr. Russell recommends a thorough clean-up. "It's that final touch that leaves a nice taste in the customer's mouth," he concluded.

• What Causes Resistance?

"Resistance from the Research Point of View," was covered by LSU entomologist, Dr. H. B. Boudreaux.

"There are three currently popular theories of resistance," Dr. Boudreaux said.

"First, is the antibody or antigen type of immunity. The reaction is said to be similar to that in a person who becomes immune to a disease after having contracted it. There is little evidence to support this theory.

"Second, is the development of resistance through inheritable changes (mutations) as a result of having been exposed to insecticides. This theory is supported by the fact that resistant insects produce resistant offsprings, often more resistant than their parents. This idea can't be completely ignored.

"Third, is elimination of nonresistant individuals allowing resistant ones to breed their kind. There are no known naturally occurring species which do not vary

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DIELDRIN
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WOOD TREATING

If you have any pest control problems, Wood-Treating will be glad to give you the benefit of their years of experience without obligation. Write!

Dr. Ralph E. Heal (right) National Pest Control Association executive secretary, and association executive vice president, **Myron W. Smith** (center), are registered at this year's Southern PCO Conference by meeting chairman, **Dr. O. W. Rosewall.** Total registration at 1956 Conference, 125.

in their tolerance to insecticides. There are always individuals who are more resistant than others, even among brothers and sisters. This theory has the most support from experimental evidence."

One of the conference highlights was an open discussion on the resistant German roach with questions fired from the floor at moderators Lonnie Holder, Holder's Pest Control, Houston, Tex.; and W. I. Elo, Pest Exterminators Co., San Antonio, Tex.

Mr. Holder said that along with resistance, PCOs are now encountering a German roach that is not acting true to form. In one reported instance, German roaches were living outside a house in grass and were entering the building at night. Another group were living inside a restaurant dish warmer where the temperature was at a constant 120-130°F.

Mr. Elo reported he had found German roaches around door and window facings outside a home and doesn't believe this is natural behavior for this species.

One idea, submitted from the floor, was that these might not be resistant German roaches at all, but rather the Vega roach which closely resembles the German roach and makes its habitat outdoors.

• Soil Poisoning to Increase

"Increasing slab construction has greatly accelerated termite research," NPCA executive vice president Myron W. Smith reported. Mr. Smith, who operates the Hill-Smith Termite Control Co. in Memphis, Tenn., said the change in architecture to low, ranch-type houses, and new central heating systems, permitting termites to operate 12 months out of the year, make termite control an increasingly harder job.

"We are rapidly approaching the day of pre-treatment for termites or what we might call 'Prescription entomology.' Termite control is going to require a different set of techniques, as well as a different set of business practices. Since ranch style construction doesn't lend itself very well to mechanical termite protectants, we are going to have to depend more and more on chemicals.

"We will find that chlordane, EDB, dieldrin, and lindane will be used more and more in the future. Additional study is needed on the use of powders and wettable powders for termite control."

Mr. Smith also stated today's recommended soil poisoning treatment requires a minimum of one gallon of the solution of choice to every 10 square feet of building area.

This year's meeting was directed by Dr. O. W. Rosewall, chairman of LSU's Department of Zoology and Entomology. L. S. Bridges, Bridges' Pest Control, Baton Rouge, was conference treasurer and registrar.

Syracuse Sanitation Conference

Syracuse University will hold a conference on the problems faced by food sanitarians and food microanalysts on April 16. The meeting is being arranged as a public service to food industry sanitarians, laboratory microanalysts and others engaged in the protection of foods.

Subjects to be covered at the meeting include: "Penetration of Protective Coverings by Insects"; "The Sap Beetle—Its Habits and Possible Control Measures in Sweet Corn"; "The Role of Microscopic Analysis in Food and Drug Control"; "Experience and Modifications in the Application of A.O.A.C. Methods for Extraneous Material in Chocolate and Candy Manufacturing"; "The Recovery of Insect Fragments from Flour, A Modification Useful for Survey Purposes, and Some Correlation with Other Factors"; and "The Use of Semi-Permanent Mounts in Sanitation Collaborative Work."

Speakers include: John E. Despaul, U. S. Army Quartermaster Corps, Chicago, Ill.; Ralph Fogler, Libby, McNeil and Libby, Blue Island, Ill.; Kenton L. Harris, Food and Drug Administration, Washington, D.C.; Fred B. Jacobson, Industrial Sanitation Consultants, Philadelphia, Pa.; Dr. F. S. Thatcher, Department of National Health and Welfare, Ottawa, Canada; and Jack Monier, General Mills, Inc., Buffalo, N. Y.

PCOs planning to attend this conference should notify Dr. J. D. Wildman, Department of Plant Sciences, 209 Lyman Hall, Syracuse University, Syracuse 10, N.Y.

German PC Meeting May 10-14

The First International Pest Control Congress will be held May 10-14 in Helmstedt, Germany. PCOs from many countries, including those behind the Iron Curtain, are expected to attend this year's meeting, according to Walter O. Blank, owner of Abalene Pest Control Service, Inc., New York City, who is handling arrangements for a group to attend from the United States.

Helmstedt, a town of 30,000, is located at the East-West Zone border in West Germany.

Host for the Congress is the German Pest Control Association. Organization vice president, O. Buettner, who is in charge of arrangements, has lined-up interpreters for English, French and Spanish speaking delegates.

Major topics to be covered at the conference include hygienic pest control, plant pest control, wood boring insects, protection against stored product pests, and material and equipment used in the pest control industry today.

A full schedule of entertainment is also planned including sightseeing trips of Helmstedt and the surrounding countryside.

Operators desiring further details and data on transportation schedules and hotel reservations should contact Mr. Blank at 2523 Bayview Drive, Fort Lauderdale, Florida.

Group shot shows some of 153 PCOs who attended '56 Eastern Conference. Retiring chairman, **Prof. Arthur Bourne,** is 6th from left in front row.

Spread of Resistant German Roach Most Important Problem Facing Northeast PCOs

Spear Tells 153 at Eastern Conference

Photographs by John Medoff

Spread of the resistant German cockroach to the Northeast is the problem of gravest concern to operators in that area today, National Pest Control Association technical director, Dr. Philip J. Spear, told delegates to the 16th Eastern Pest Control Operators' Conference.

As lead off speaker, Dr. Spear suggested the 153-man group attending the meeting at the University of Massachusetts, Amherst, refer to the recently issued NPCA Technical Release 18-55 for detailed information on the resistance problem and NPCA suggestions for meeting it. Dr. Spear also reported that further resistance investigations will be made through funds appropriated at last year's NPCA Denver convention.

During the three-day conference held February 2-4, operators were also brought up to date on lawn maintenance and pest control, rodent control, pest control problems following disasters, sanitation, resistance and pest control in new buildings.

• Lawn Problems

Dr. Spear next introduced a three-man panel who covered lawn maintenance and pest control. The first speaker, Prof. Spencer Davis, plant pathologist at Rutgers University, New Brunswick, N. J., spoke on lawn diseases. Davis said the pest control operator now understands and has a good reputation in the field of insect control, but neither he nor the homeowner has an adequate knowledge of turf disease control. He made a clear-cut recommendation that PCOs should keep out of lawn disease control business, although it would be smart to know something of the problems and have chemicals available to sell to homeowners who wish to make their own applications.

Most lawn problems are due to mechanical factors involving extremes of heat and cold, wet and dry, short and long cutting, heavy and light fertilizer. All of these have a bearing on the success or failure of fungicidal applications. Good disease control would call for spraying probably every 10 days from April through September, using several different chemicals. A material successful for the control of one disease may have no effect upon a second disease, possibly present at the same time.

The second speaker, Dr. Theodore W. Kerr, entomologist at the Rhode Island Experiment Station, Kingston, illustrated with slides his talk on "Lawn Insects." He made recommendations on the insecticides, the rates of application and the best times for treatment. Much of the material used in Dr. Kerr's talk will, he reported, be included in a forthcoming revision of the Rhode Island Experiment Station's bulletin on lawn insect control.

Final speaker on the panel was Prof. Lawrence S. Dickenson, University of Massachusetts agristologist and long-time consultant on lawn problems. Prof. Dickenson advised that the grass plant must be regarded as an individual, with individual requirements and tolerances for optimum survival and growth. Many mixes of grass seed contain low percentages of actual grass plants and therefore will not stand continual cutting. Three basic elements of lawn construction include a sandy loam topsoil, a subsoil blended with the topsoil, to which it supplies a constant supply of moisture, and a stable foundation. Prof. Dickenson supported the contention of Prof. Davis that good lawn management and care does not belong in the hands of the pest control industry, but should remain the responsibility of individual homeowners, to whom authoritative advice can be given.

Thursday afternoon was devoted to rodent control problems, and pest control operations following disasters.

The rodent control session gave PCOs an opportunity to bring out problems on this subject for advice from a panel consisting of W. W. Dykstra, Assistant to the Chief, U. S. Fish and Wildlife Service, Washington, D.C.; Dr. D. Glen Crabtree, Motomco, Inc., New York, N. Y.; Rudolf Grun, American Chemical Paint Co., Ambler, Pa.; Herman Ratner, Ratner Pest Control Operators, Atlantic City, N. J., and eastern

chairman of the NPCA's rodent control committee; Donald H. Lewis, Rose Exterminator Company, Rochester, N.Y.; Dr. Ellsworth Fisher, Entomologist, State of Wisconsin, Madison, and consultant to the Wisconsin Alumni Research Foundation; Dr. Spear and Howard A. Merrill, district agent, Fish and Wildlife Service, Boston.

Mr. Dykstra reviewed recent developments in rodenticides and rodent-baiting materials. In response to several questions on the subject of acceptability of baits containing anticoagulants, the panel agreed there is no evidence to indicate resistance in rats and mice to these rodenticides. Acceptability of baits is generally limited by poor bait materials and occasionally by contamination by such insects as ants which may get into baits, particularly if sugar is added. Mr. Dykstra summarized that while present anticoagulant rodenticides are extremely valuable, industry and research personnel should be looking for improved materials within this group which would give somewhat more rapid kill without greatly sacrificing the safety features of anticoagulants.

• Disaster Pest Control

Flood-caused mosquito and rodent problems were used to illustrate the need for pest control following disasters. Robert Armstrong, Entomologist and Superintendent of the East Middlesex, Massachusetts, Mosquito Control Project, described the tremendous mosquito problems created by floods and hurricanes in eastern Massachusetts last summer and fall. He pointed out the limitations of residual and mist applications for combatting widespread mosquito populations, and described aircraft applications as most suitable for large-area control work.

Mr. Merrill's observations of rat activity following the August floods in New England brought out the fact that rats are more or less constantly on the move following floods and during subsequent rescue and rehabilitation periods. In general, rodent control campaigns cannot be effectively carried out until the rat activities are stabilized. If rodent-borne diseases are present, control operations should be instituted promptly.

Robert Carson, Sanitarian, U.S. Public Health Service Training Station at Amherst, Massachusetts, explained emergency sanitation measures and government aid in disaster relief.

PCO George R. Elliott (second from left), Ransford Pest Control, Worcester, Mass., gets plenty of help at Eastern Conference laboratory identification session. Left to right standing are **Dr. Marion E. Smith,** of the University entomology department; **Donald H. Lewis,** Rose Exterminator Co., Rochester, N. Y.; and **Jack Rudick,** Western Exterminating Co., Montreal.

In addition to the needs for emergency water purification and emergency waste disposal methods, Carson described some of the fly-breeding problems caused by floods. While cleaning up buildings, much food material and other organic matter, capable of supporting fly breeding, accumulates much faster than it can be removed. He reported good success with 5% DDT emulsion spray applied to all potential breeding materials, but said large space sprayers may be required if larviciding is not effective in preventing production of large numbers of adult flies.

Dr. Spear, who is preparing as an NPCA assignment, a plan to describe the pest control industry's part in disaster aid, urged close cooperation between PCOs and their associations with comparable local and state public health officials. He said a well-organized plan, prepared in advance, is essential if operators are to effectively use their skills and equipment to bring relief to disaster-stricken areas.

Friday morning's program was entirely devoted to laboratory identification of food plant pests, aided by beautifully-illustrated sheets prepared by Dr. Marion Smith and the staff of the Department of Entomology under Dr. C. P. Alexander.

A sanitation forum occupied the afternoon session. Max Garber, District Sanitary Officer in western Massachusetts, led off with a plea for closer cooperation and mutual understanding between the sanitarian and PCO.

• Can Small PCO Compete In Food Plant Control?

A paper by PCO George Hockenyos, Sentinel Laboratory, Springfield, Illinois, pointed to two alternatives for operators confronted by food plant sanitation problems. Small operators banded together, perhaps through a corporation, might set up a sanitation firm of their own to operate in their region. A considerable investment would be required to provide a control laboratory, a competent sanitarian and a good business manager, he said, but it would enable small operators to compete with large ones who already provide such service.

The other alternative is for the small operator to inform himself of sanitation fundamentals through attendance at courses such as that provided by the extension service of the University of Illinois at Urbana. Mr. Hock-

"It's a psuedopalacoesox megalodonta, Med.," **Dr. C. P. Alexander** (right), head of the University entomology department tells **Prof Arthur Bourne** (center), retiring conference chairman. Looking with envy at the one "that didn't get away" are (l to r): **Dr. Philip J. Spear,** NPCA technical director; **Dr. Frank Shaw,** University entomologist; **David P. McAlindin,** Royal Exterminators, Newark, N. J.; **Mark Weintraub,** Terminix Co. Of Massachusetts, Boston; **Fred Bowers, Bowco** Laboratories, Rahway, N. J.; and **F. E. Bohman,** Birchard System, Inc. Hartford, Conn.

enyos recommended that if the small operator does not find his place in the field of big plant maintenance, he had at least better be prepared to grow up with the developing needs of small pest control accounts. Although sanitation is a broad field, the individual operator can at least qualify himself to offer simple, good housekeeping advice to his present customers, he concluded.

• Honor Professor Bourne

A feature of Friday evening's annual banquet was a series of testimonial remarks and presentations honoring Prof. Arthur I. Bourne, who is retiring as business manager of the Eastern Pest Control Operators Conference.

Representatives of the University and pest control industry publicly acknowledged Prof. Bourne's accomplishments in 46 years as an entomologist with the Massachusetts Agricultural Experiment Station and his 16 years of service as co-chairman of the Eastern Conference. Among the tokens of esteem presented to Prof. and Mrs. Bourne were a scrapbook of photographs of past conference meetings and a console television set.

Dr. Frank R. Shaw of the University has been named to succeed Prof. Bourne as business manager for future conferences and John Weidhaas also of the University entomology department, will succeed Dr. Shaw as compiler of references on pest control.

Retiring Eastern Conference chairman, **Prof. Arthur Bourne,** (right) is presented a National Pest Control Association citation honoring his services to the industry by past NPCA president, **George R. Elliott,** Worcester, Mass.

Resistance was the first topic on the Saturday morning program. This subject was covered by Dr. John Pratt, entomologist with the U. S. Army Research Development Laboratory at Natick, Massachusetts.

Dr. Pratt reported resistance is often present and can be measured long before practical control failures occur. Once established, however, resistance will probably persist for some time, particularly when it involves residual insecticides such as DDT and chlordane, whose residues may remain for a long time after they are applied. Long-lasting residues are ideal for developing resistance, whereas insecticides having short residual life of three days, for example, allow few survivors and permit very slow development of resistance.

Dr. Pratt said that when resistance has been encountered, alternating between related insecticides often results in a rapid increase in the rate of resistance. Tolerance to related compounds develops more rapidly than between unrelated compounds.

He reported some resistant German cockroaches have also been found to be resistant to a lesser extent to pyrethrins and that houseflies in limited areas of Florida have shown some resistance to organic phosphates used in baits. Dr. Pratt concluded that new compounds appear to be most promising. In discussion, it was brought out that dieldrin is gen-

(Continued on page 60)

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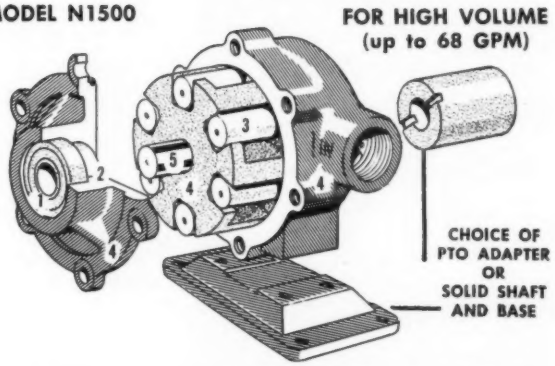

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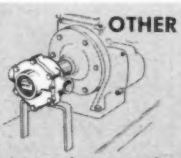

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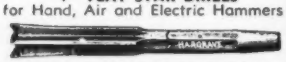

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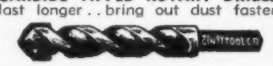

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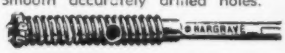

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Combined Business, Technical Program Draws 86 to Oklahoma PCO Conference

Business techniques shared the spotlight with control procedures at this year's Oklahoma Pest Control Conference in line with a growing operator demand for more practical "profit-making" information along with technical assistance. Some 86 operators from six states attended the three-day meeting at Oklahoma A. & M. College, Stillwater, to hear experts cover such business topics as sales, public relations and pricing.

During the January 23-25 conference, PCOs were also led through the intricacies of legislation, public health, pest identification, termite control, general pest control in homes, insect biology, chemical uses and hazards, and weed and grass control.

Harry Canup, director of A. & M's. Business Extension Service described three types of competitors PCOs have to deal with: (1) Price cutting competitor who is annoying but who you can't do much about; (2) indirect competitor who tries to sell your client an entirely different type of service, and who is by far the most serious competition; and (3) you, yourself who are not selling and promoting your business efficiently.

Tackling public relations was Mrs. Phyllis Edmonds, vice president, Home Federal Savings and Loan Association, Tulsa. Mrs. Edmonds gave practical tips on how operators can present their services in the most favorable light, make people want their services, and how to acquire the skill of getting along with people.

What's a fair price for a pest control job and how do you arrive at it? Dr. George B. McCowen, professor of accounting at A. & M. presented a bid formula to PCOs that would enable them to make a profit or recover costs on any particular job.

Clyde A. Bower, director of Oklahoma's Board of Agriculture and administrator of the State Structural Pest and Termite Control Act, reported compliance inspection statistics disclosed that the public of Oklahoma was getting an increasingly effective quality of service. G. E. Gerhardt, sanitarian for the U. S. Public Health Service in Oklahoma City, praised the growing cooperation between the pest control industry and sanitarians and the technical advancement of the individual PCO.

Termite talks at the conference covered such phases as slab construction, recent advances, and control practices throughout the nation. Speakers included R. M. Russell, technical director for the Orkin Exterminating Co., Atlanta, Ga.; Gayle Puryear, Antimite Termite Co., Tulsa; Dr. Ralph E. Heal, National Pest Control Assn. executive secretary; and L. W. Orr, Chief, Division of Forest Insects Research, U. S. Department of Agriculture, New Orleans, La.

At another session, Dr. Byron Williamson, Agricultural Specialties, Dallas, Tex., explained the physical properties of emulsions. Dr. Williamson said that the emulsifying agent was generally the most expensive part of an oil in water emulsion. Any manufacturer can make a good emulsion, he added, but all too often a firm will "cut" emulsifying agents in order to produce a lower priced article. A good emulsion, Dr. Williamson concluded, keeps the active ingredients and soluble oil evenly suspended in the water carrier over long periods and does not allow the killing agent or the oil to settle on the bottom or sides of the container.

Other conference speakers included: Dr. F. A. Fenton and Dr. G. A. Bieberdorf, entomologists at Oklahoma A. & M.; C. F. Stiles and Newton Flora, extension entomologists; and Professor Cliff Elder, of the college's agronomy department.

At a business meeting of the Oklahoma Pest and Termite Control Assn. held during the conference, W. J. Pinkston, Capitol Termite Co., Oklahoma City, was elevated to the presidency. Other new organization officers are: vice president, A. M. McIntosh, McIntosh Termite Co., Tulsa; secretary-treasurer, Tom Graham, Graham Pest Control, Oklahoma City; and chairman of the termite control committee, Harold Schnorrenberg, Dead Shot Chemical Co., Oklahoma City.

On hand to represent the National Pest Control Association were president, I. B. Carncross, of Syracuse, N. Y.; and executive secretary Dr. Ralph E. Heal.

Termite Proofing Injuries To Shade Trees and Shrubs

By DR. SPENCER H. DAVIS, JR.

Rutgers University, New Brunswick, N. J.

Based on a talk presented at the Thirtieth National Shade Tree Conference held at Atlantic City, N. J.

Diagnosing the cause of trouble in shade trees and shrubs, at best, is a difficult job. With a majority of the diseases and insect pests there is something to go on however.

Fruiting bodies of fungi, specific symptoms of particular diseases or insects, and their characteristic feeding marks or their eggs do give definite diagnostic criteria. Thus, with the infectious type of trouble or insect infestation, we are on pretty sure ground even though it may be difficult to recommend a cure.

But, when diagnosis eliminates the possibility of insects, fungi, bacteria, or viruses, pinpointing the trouble becomes more confused and elusive. Here we enter the field of physiological troubles.

Many things can cause damage to, or death of a tree. Gas leaks, salt on the sidewalk, high tide in seashore areas, sand storms, fertilizer burns, etc., could all be responsible. But another source of trouble is certain types of termite chemicals.

It is often difficult to convince people that these chemicals can be responsible for damage when the injured tree is 20 or 30 feet from the house, whereas, shrubs forming the foundation planting and the small bushes between the home and the tree are not affected.

What are the reasons for this seeming anomaly? Generally speaking, small trees and shrubs are rather shallow rooted. Roots of grass used on the home lawn penetrate only inches into the soil. At a depth of eight to twelve inches there is a hard pan or a relatively impervious layer of soil. Above this layer shrub and grass roots are abundant and soil is light, porous and allows rather rapid transfer of gases or volatile materials.

Below this hard pan is lighter and more porous soil. Volatile materials will not rise through it and the less penetrable hard pan above, so readily. Down in this lighter soil may be some of the farthest reaching roots from an injured tree standing 20 or more feet away.

Whether the chemical used for termite control is of a volatile nature or not, the method of its placement in the ground around the home will more likely cause it to come in contact with deeper tree roots than those of grasses, ground covers, or small shrubs close to the house. Distance of trees or shrubs from a treated building is not reason enough for eliminating the termite proofing chemical as a possible cause of damage.

● Case History Cited

Here is a recent case where a termite treatment was responsible for tree damage.

Three-fourths of a street tree, growing in the usual planting strip between the curb and sidewalk, died very suddenly after a home was treated for termites. The house stood back 60 feet from the curb line.

In this instance it was felt the tree's roots did not extend back into the home area, but rather reached into a trench or ditch, 15 feet away, which carried an oil supply line that had been laid many years before. How far toward the house roots went or how far out from the house into the pipe line trench the chemicals advanced is not known. But it is known a large section of the tree was killed immediately after the house was treated. Apparently there could have been only one cause.

● Species Respond Differently

Different tree species respond in various ways depending upon the size or type of root system. Those more prone to injury are oak, hackberry, London Plane, apple, and maple. The beech and elm of similar size and similar distance from the treated area are not so apt to be injured. Holly and Yew growing close to the foundation are more apt to be injured than are azaleas, pachysandra, ivy, etc.

How is it possible to more correctly diagnose termite chemical damage to a tree or shrub?

First, determine the species of tree involved. Trees or shrubs with far reaching root systems such as oak, sweet gum and black locust are more likely to be affected than some of the coniferous and deciduous trees which do not have such a far reaching root system.

The side of the tree affected is another good criterion. In the normal or usual cases, the side facing a treated building will show most severe damage. This may affect only a branch or two, or may kill the entire side of the tree if it is close enough to the treated area. This is, of course, normal since in most plants specific branches are fed primarily by a few specific roots and the toxic material taken up by one root will result in injury to only a few branches, usually immediately above the root.

On the other hand, there may be times when injured branches facing the house are in perfect condition. Do not dismiss termite proofing injury as a possibility in these cases, but examine the tree more closely. Some trees, of which apple is the most notable, often have a twisted or spiral staircase type of trunk. Thus if we imagine the trunk to be like a twisted bottle of straws at a soda fountain, the water conducting tubes in the tree trunk have their origin on one side of the tree, but by virtue of the twist of the trunk these same tubes then feed branches on the opposite side of the tree.

Symptoms in leaves or needles

Published through the courtesy of the Editors, Combined Proceedings of the Thirtieth National Shade Tree Conference and the Twenty-First Western Chapter National Shade Tree Conference.

of affected plants may also help in diagnosis, if they are not completely dead. In common leaf scorch resulting from dry soil or scorching winds, the area between the veins on deciduous leaves or the tips of needles on conifers first show this trouble. When we think of a leaf being similar to soils in dry, arid parts of the country where vegetation is most abundant along irrigation canals, it is easy to understand why veins of the leaf or basal portions of a pine needle remain green long after leaf scorch has caused the rest of the area to turn brown. Likewise, cases of aerial fumigation by things such as fluorine gas will cause needle tips and interveinal areas of leaves to be killed first.

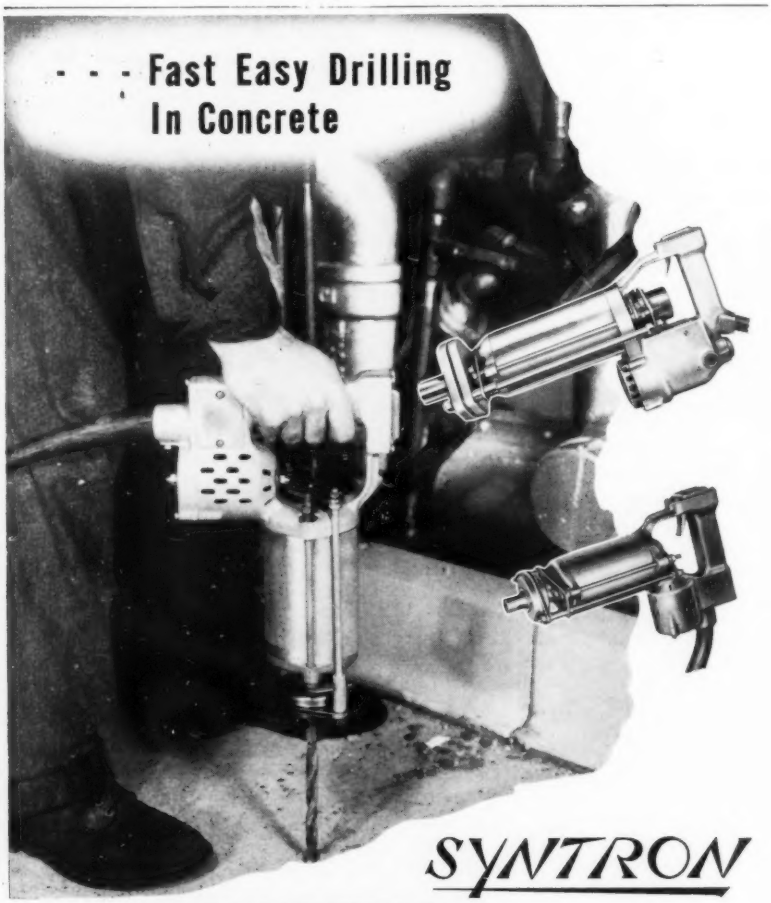
In the case of soil poisons, the same veins which carry water and nutrients to the leaves also carry the toxic materials first to those areas nearest the veins. As a result, when only part of the leaf or needle is injured, it is usually revealed as a burning of the veins and immediate vicinity in the leaf.

● Chemical Injury Immediate

Finally, the time lapse period may be a good indication of what caused the damage. Injury from termite proofing will show up in a matter of days after the chemicals are applied. If the time between termite proofing treatment and trouble with plants is separated by as much as a month, we can pretty much rule out the chemical as the cause of such trouble. If it shows up in a matter of days after the treatment, it is pretty safe to assume the termite chemical is the cause.

This may help some in pacifying a home owner who fears the loss of all trees and plants on his property because one may have been destroyed by a termite soil poison. Those plants or parts of plants which show no injury at the end of several weeks after termite treatment are probably safe from future troubles. Thus, the client can be assured the damage is not going to progress indefinitely.

One protection that can be taken to prevent chemical contact of tree roots is a good deep root pruning of all trees which stand anywhere close to the building to be treated. By narrow trenching to a depth of several feet around the house and four or five feet out from the foundation, the roots of trees and shrubs beyond that point will then be severed and cannot carry any toxic materials back to the tree. This may require the services of an expert tree man.



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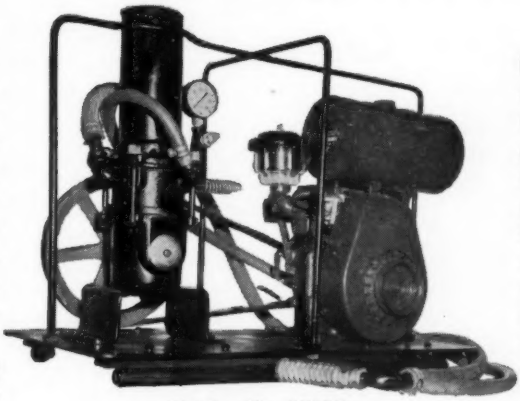

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Poll Reveals PCOs Expanding Into Weed Control and Custom Spraying

To find out what its readers were doing *Pest Control* surveyed 25% of its total U.S. pest control subscribers and found a decided industry trend toward expanding into both weed control and custom spraying service.

● Weed Control

30% of the firms responding report they are now engaged in weed control and another 58% said they are interested in getting into the field. When asked if they felt there is a good potential market for PCOs in weed, lawn and ornamental pest control, 48% wrote they felt this is a profitable potential for industry expansion.

Of those already engaged in this phase of urban pest control, 24% say they now do industrial weed control, and an equal number report they control insects of ornamental shrubs, lawns, etc.

Here are some typical comments subscribers from various states "wrote-in":

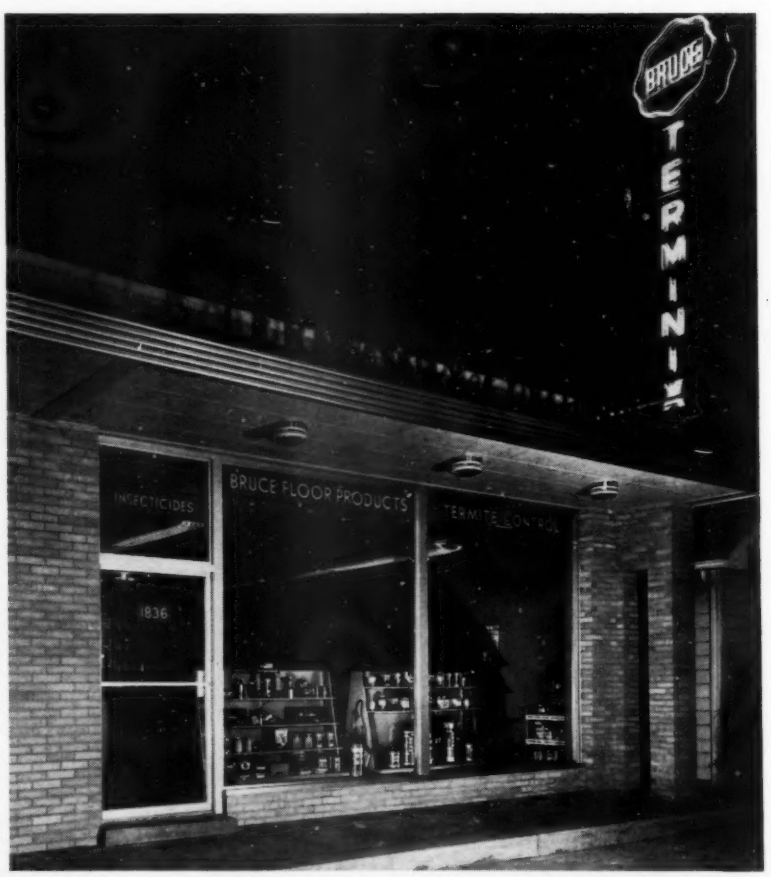
"*Monthly weed control contracts lucrative*," Florida; "*Just as important as roach and rat control*," Ohio; "*A virgin field where if more complete knowledge were acquired, it would be beneficial to the public at large and profitable to the PCO*," Maryland; "*It goes hand-in-hand with many of the services we now do and is frequently asked for*," Oregon; "*This could fall in line very easily with termite work*," Pennsylvania; "*Many estate owners and managers ask 'Why don't you service flower gardens and greenhouses?'*," California; "*Weed control holds a good potential because more people now own their own homes and they know they can buy this service*," Texas; "*A lot of my customers ask for this service*," Missouri.

Other comments received included: "*There is a good profit and small extra expense in weed and lawn insect control. Both can be done by the average PCO with his present equipment*," Texas; "*People seem to like to buy all their pest control work from one firm*," Texas; "*The trend today is that people are very interested in their homes and anything that applies to it or its maintenance*," New Jersey; "*Most warehouses, stockyards, etc. find weed control can be done by experts cheaper than they can do it themselves*," Georgia; "*In the larger cities, industry and estates are interested in this service*," Indiana.

● Custom Spraying

Although the term custom spraying was not defined in the survey, it is generally understood that for pest control operators it means the application of chemicals that are too toxic for the public to handle, or requires expensive equipment customers cannot afford for casual use.

Of the better than 300 firms responding to the survey, 26% said they are now engaged in cus-



PCO uses window to display allied sanitation products. Shown in this modern storefront window of the Terminix Company of Indiana, Inc. (Indianapolis) are PCE's Burmos sprayer, Idico hand sprayer, aerosol bombs, larger sprayers made by Hudson and John Bean, Black Leaf brand pesticides and a full line of Bruce floor products. Robert Heaton, Terminix Indiana president says that since this photograph was made he has improved the appearance of their profitable retail setup by the addition of more racks and shelves so that "it is twice as attractive as the picture shows."

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These formulas promise top kill against *all* flies contacted. *None* are resistant to these insecticides. Keeps flies and other insects away from treated surfaces. Residual effectiveness lasts up to two weeks!

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. . . or . . . Professional 3-Pound Bomb

TWO STRENGTHS:

Double Duty or Industrial (*) Strength

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wrl

tom spraying and 30% say they would be interested in entering this kind of work. 31% feel there is a good opportunity for PCOs in this field and 4% see no future in it for our industry.

In telling why they feel this can be another opportunity for industry expansion, readers from various parts of the country provided the following comments:

"*Not many potential customers have the manpower or equipment to spare,*" Minnesota; "*We have many rural customers. Calls on rural insect pests are numerous and we are learning the hard way. Our hobby as a truck farmer helps considerably,*" Ohio; "*Field seems to have room for specialists,*" Texas; "*85% of my business is outside of buildings and I do much custom spraying,*" Nebraska; "*Am not familiar with this type of work but feel with our heavier equipment we would have a substantial advantage over the men I now see spraying highway right-of-ways for the state with one and three gallon hand pump sprayers,*" North Carolina; "*Newer chemicals permit excellent results. It's a vast field provided work is done thoroughly, honestly, by experienced personnel, using the right equipment,*" New York.

When asked what type of equipment they use for weed control and custom spraying, readers wrote-in these names. (They are listed according to the frequency with which they were mentioned): John Bean, Hudson, Essick, Ewing, Hardie, Myers, Buffalo Turbine and Tifa.

FDA Cites 7 Firms for Filth

Seven more firms have been cited by Food and Drug Administration inspectors for manufacturing and distributing insect and rodent contaminated products.

The seven violations are:

A Los Angeles, Calif., bakery fined $2,000, and the firm owner fined $1,000, for distributing pies containing insect and rodent hair fragments and being prepared, packed and held under insanitary conditions.

Bread and rolls containing insect parts and rodent hair fragments, prepared under insanitary conditions, cost a Lynn, Mass., bakery $300 and the owner $100.

Date nut bread in a bakery in Waltham, Mass., was found to contain rodent hairs, and was prepared under insanitary conditions. The firm was fined $200.

A Trenton, N. J., bakery was fined $200 and the owner placed on three year's probation for distributing bread containing insects, and prepared under insanitary conditions.

In Tyler, Texas, candy containing moth, beetle, and rodent filth, and prepared and packed under insanitary conditions, brought a $2,500 fine and a 30-day jail sentence to the owner. Fine and jail sentence were suspended and the defendent placed on probation for one year.

Apple cider containing fly eggs and maggots, prepared under insanitary conditions, cost a Belleville, Ill. firm $200 plus court costs of $35. Charges against the firm owner were dismissed.

A Brooklyn, N. Y. food company was fined $500 and the firm owner placed on probation for two years for distributing sugar-coated peanuts containing insect fragments, prepared under insanitary conditions.

It pays to control

bad odors

after pest control

Any insecticide that leaves an offensive odor can create ill-will and lose business.

Remove odors quickly by using Aireactor—the new deodorizer—right after applying any odorous insecticide or chemical. Also ideal for the quick dissipation of **smoke** odors after a fire. It's a good way to build good will!

Aireactor is a clear, non-flammable solution formulated from rare non-toxic elements found in plant life. It destroys odors instead of masking them—leaving the air fresh and clean-smelling.

Aireactor can be used indoors as a spray, or in air conditioners, air ventilating systems or mechanical ventilators; or applied outdoors in a fogging machine or spray gun. And it is economical—a little does a big job!

Get the full Aireactor story now—it can save you money. Send for free folder on odor control.

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AIREACTOR SPACE DEODORIZER

NATURE'S PRESCRIPTION FOR FRESHENING AIR

You Can **MAKE MORE MONEY**

by using and selling

FUMO-KILL

The New, Safe Fumigant that will kill

Spiders, Moths, Mosquitoes, Silverfish, Wasps, Waterbugs, Bedbugs, Roaches, Etc.

FUMO-KILL is truly the modern method of insect extermination. Light match to contents in can will produce fumes—NO FLAME. Non-hazardous. This amazing **FUMO-KILL** insecticide has been tested, and found effective against most types of Household Pests.

FUMO-KILL has the following advantages:

EASY TO USE: Fine Vapors destroy pests and their nests.

ECONOMICAL TO USE: Two-ounces Fumigates up to 6,000 cubic feet.

EFFECTIVE TO USE — Vapors Penetrate Entire Room—Every Crack and Crevice

FUMO-KILL can be obtained in 2 oz. (enough for up to 6,000 cubic feet)—4 oz. and 1-lb cans.
Cost of 12—2-oz. Cans . . . $7.50 per doz.
Cost of 12—4-oz. Cans . . . $13.50 per doz.
Bulk . . . . . $4.50 per lb.

Delivery Charges Prepaid
For complete information write or phone today.

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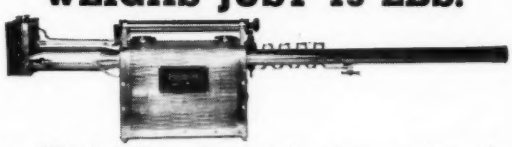
for factories, hotels, farms, dairies, warehouses, country clubs, auto courts, golf courses, parks. Dyna-Fog Jr. now has 31 different known applications!

WEIGHS JUST 19 LBS.



- "Outfogs" anything in its class—extremely dense insecticidal fog output at rates up to 15 gals. per hour.
- Fog particle size selection from 0.5 to 75 microns.
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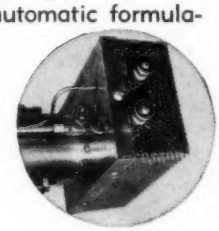

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NOTE!

We also make a Dyna-Fog insecticidal fogging machine that does work of 650 lb. and heavier machines, yet weighs only 100 lbs.!

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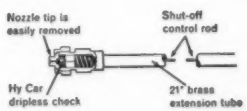
X-Pert*

Brilliant performer for the professional! When you pump, it signals at 55 pounds pressure. Nozzle pressure is held at 25 pounds, below which it shuts off, assures constant spray pattern, uniform droplet size. Shuts off at nozzle... won't drip! Tank cover seals from within: *the higher the pressure the tighter the seal!* Tubular handle stores extra nozzle tips! Tubular strainer at control valve. Footrest. Nu-Action* pump. Welded tank. Five feet of Kem-Oil* hose.

*That's the X-Pert** ... all-stainless steel or with galvanized tank and brass pump ... in 3- and 4-gallon sizes.



Pump valve limits tank pressure.

Valve regulates discharge pressure.

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What's NEWS In The Industry

Louisiana PCOs Fight to Get Stricter Enforcement of State Pest Control Law

Louisiana Pest Control Association members are pressing state officials to do something about lax enforcement of the State Pest Control Act.

At an organization business meeting held during the recent Southern PCO Conference in Baton Rouge, several prominent state PCOs urged the Pest Control Commission be sued for "malfeasance of office."

Under the Louisiana Act a pest control operator must be licensed and post a $2,000 surety bond with the Commission. Some operators, the association claims, are operating without a license or without a bond, and some that are actively engaged in control work lack both.

The Act also provides for inspectors who check termite jobs and report violations of accepted control procedures. State PCOs charge that not only are inspectors ignoring this function, but some are actively engaged in pest control work themselves. One inspector is reportedly doing termite jobs without a license.

Louisiana operators support the enforcement program by paying $5 for every termite contract they write. PCOs say no use is made of money in the fund thus being enlarged by their payments. At last report, over $250,000 had been built up in this fund.

The controversy was brought before the public when a reporter from the Baton Rouge newspaper who covered the Association meeting, made it page one news in the next day's issue. The story was picked up and printed by leading newspapers throughout the state.

Louisiana Association president Stanley McKenzie, of McKenzie Pest Control, Lake Charles, advised **Pest Control** just before press time he thought this publicity had "done a lot of good" and raised the level of the pest control industry in the eyes of the general public. "They know enforcement of this Act is for their benefit," he said.

According to reliable reports, the Association does not plan to bring suit against the commission as suggested by some of its members. Instead, the Association hopes to apply pressure on the legislature to put "teeth" into existing legislation when the state administration changes in May with the inauguration of the new governor, Earl Long. Some expected changes of present personnel on the State Pest Control Commission and a greater "spirit of cooperation" on the part of the Commission, due to the publicity, is also expected to step-up enforcement of pest control legislation.

In the past, pest control operators have not been told when a meeting of the Commission is to be held. As a result of publicity given the demand for more cooperation, the Commission has now agreed to make public announcement of all future meetings.

USDA and AAR Urge Better Fumigation Procedures in Railroad Freight Cars

The increasing amount of fumigation of commodities in freight cars has caused the growth of certain injurious practices which are resulting in damage to needed freight cars, as well as agricultural commodities, it has been reported by agricultural and railroad officials.

In view of the problem, the U.S. Department of Agriculture and the Association of American Railroads feel that several of these practices can be corrected by pointing out their undesirable effects and suggesting alternate methods that are not objectionable.

The cooperation of shippers, companies engaged in commercial fumigation, railroad employees, and others is needed to establish new and better procedures.

● Boring of Holes in Car Floors

In many instances, it is the practice to insert the tubing through which the fumigant is introduced into a freight car by boring a hole in the car floor. Failure to plug the hole after the fumigation may result in loss of the commodity from a subsequent bulk shipment.

The Department and AAR urge that (1) the tube be inserted through a crack between the door and the door frame if at all possible, and (2) if it is necessary to bore a hole in the floor the hole should be plugged with a wooden dowel when the fumigant tube is withdrawn.

A study is being inaugurated by the Department and the Association looking to improvement in procedures of fumigation of commodities in freight cars.

● Use of Gastight Paper to Cover Floor

It is often recommended that the car floor be covered with a gastight paper to prevent loss of fumigant through the floor. Kraft paper alone is not gastight, so laminated papers are needed;

National Pest Control Association 1956 executive board members posed for this picture at a recent meeting in New York City. Left to right (seated) are: **A. E. Ritt,** Philadelphia, Pa.; **H. E. Jennings,** Chicago, Ill.; **J. Wilfred Gunn,** Los Angeles, Calif.; and President **I. B. Carncross,** Syracuse, N.Y. Standing left is **Harlem B. Ives,** Detroit. At right is executive vice president **Myron W. Smith,** Memphis, Tenn.

some types of papers are laminated with asphalt compounds which "bleed" and stain sacks and the commodity in contact with them.

It is recommended that papers laminated with asphalt be used for this purpose, which show no staining when held in an oven at 150°F. under ½ lb. per sq. in. pressure for five hours, as prescribed in standard T475M50 of the Technical Association of the Pulp and Paper Industry.

● Spraying of Liquid Fumigant On Ceiling Insulation

Liquid methyl bromide can dissolve the asphaltic compounds used on freight car ceilings. It should always be remembered that while asphalt resins are readily soluble in liquid methyl bromide, the gas phase of this fumigant has virtually no effect on asphalt. When introduction tubes are improperly placed so that methyl bromide is sprayed on the ceiling, the compound is dissolved and drips onto the commodity, staining sacks and packages as well as the commodity.

It is recommended that a fitting be used on the end of the tube so that the methyl bromide is directed toward each end of the car. If a fitting is not available, one may be devised by closing the end of the tube and drilling a hole clear through the tube horizontally below the tip.

Similar care is needed when liquid grain fumigants are applied to loads of bulk grain or other commodities to prevent their contacting the ceiling, since the ingredients of these fumigants are also solvents of asphaltic compounds. These fumigants must be applied uniformly over the top of the load to produce good results. When applied too heavily to one area, they may reach the car floor in liquid form where they dissolve caulking and cause staining of the grain.

Further information may be obtained from the Stored-Product Insects Section, Agricultural Marketing Service, Washington 25, D. C., or the Freight Loss and Damage Prevention Section, Association of American Railroads, 59 East Van Buren Street, Chicago 5, Ill.

Gunn Elected N. C. Head

T. M. Gunn, Orkin Exterminating Co., Charlotte, N. C., was elected president of the North Carolina Pest Control Association

New North Carolina PCA officers are (l. to r): President, **T. M. Gunn,** Charlotte; vice president, **Roy Goforth,** Fayetteville; secretary, **Miss Delia Copley,** Durham; director, **J. W. Taylor,** Wilmington; director **Ivey Coward,** Greenville.

at the recent North Carolina PCO Short Course, held at State College, Raleigh. Picked to serve with Mr. Gunn are: vice-president, Roy Goforth, Arrow Exterminators, Fayetteville; and secretary-treasurer, Miss Delia Copley, Best Exterminating Service, Durham. New board of directors members are: Ivey Coward, Ivey Coward Co., Greenville; and J. W. Taylor, Taylor Exterminating Co., Wilmington.

Over 88 PCOs registered for the two-day meeting which covered material on pest control problems, insect resistance, toxicity, rat and mouse control, wood rot fungi, termite research, insurance, and business promotion.

Some of the featured speakers at this year's meeting were Dr. Arthur Kelman, plant pathologist at State College; Walter W. Dykstra, assistant chief, Branch of Predator and Rodent Control, U. S. Fish and Wildlife Service, Washington, D.C.; R. Joseph Kowal, Southeastern Forest Experiment Station, Asheville, N.C.; Dr. Ralph E. Heal, executive secretary of the National Pest Control Association, New York, N.Y.; and Jerry H. Goodman, B. & D. A. Weisburger, New York, N.Y.

Other featured speakers were D. L. Wray, Matt Russ, F. E. Guthrie, R. T. Gast, and J. E. Hutto.

Dr. Clyde Smith, head of State College's entomology department was conference chairman.

Baxter Ind. PCA President

Donald C. Baxter, of Baxter Exterminating in Anderson, was elected president of the Indiana Pest Control Association during its meeting in Lafayette on January 30. Other officers picked by the 50 members present were: vice president, P. D. Gause, American Pest Control, Muncie; secretary-treasurer, Professor John V. Osmun, Purdue University; and directors: Charles O. Partlow, Reliable Pest Control, Lafayette; W. A. Clay, Clay Exterminating Co., South Bend, and Robert O. Williams, R. O. Williams Co., Evansville.

OBITUARIES

George W. Dyar

George W. Dyar, 47, manager of the Rose Exterminator Co. in Hartford, Conn., died recently in a Hartford hospital. He was a past president of the Connecticut Pest Control Association and a member of the New England Pest Control Association. At one time he served on the National Pest Control Association's board of directors.

Before joining Rose, he was a rodent control specialist with the U. S. Fish and Wildlife Service for nine years. Mr. Dyar is survived by his wife, Grace, and a son, Gerald.

Frank C. Hockema

Dr. Frank C. Hockema, administrative dean and vice president of Purdue University, succumbed to a heart attack on Friday, February 3rd. He had been in ailing health for some time. Delegates to Purdue PCO conferences in years past will remember Dean Hockema for the humorous pest control poetry he composed for and read at the annual banquet each year.

Louis L. Paul

Louis L. Paul, owner of Nueva Exterminating and Fumigating Co., Chicago, Ill., passed away after a long illness in Chicago recently. An active member of the Illinois Pest Control Association, Mr. Paul is survived by his wife, Violet, and son, Leonard.

Purdue Conference

(from page 38)

ing during the conference, Professor Davis returned his friends' tributes by thanking them for the many pleasures they had helped give him in his entomology career. "I have had more than my fair share of 'luck,'" he said, "in both the early instruction I received at the University of Illinois, and in the high-quality of staff members with whom I have had the privilege of working at Purdue."

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BIRD CONTROL

AS ONE OF YOUR **SERVICES**

TREE TANGLEFOOT

COMPOUND

- OLDEST
- BEST KNOWN
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A POSITIVE CONTROL OPENS AN UNLIMITED FIELD FOR PROFIT

A complete packaged line — bulk for custom application and small sizes for counter or customer resale.

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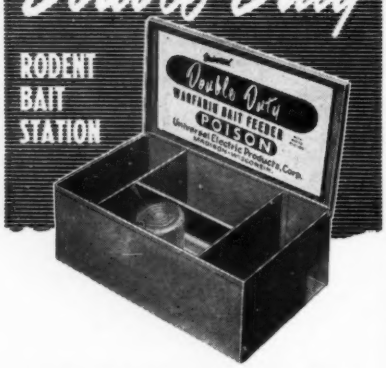

Feeds BOTH dry and liquid bait, at the same time!

Constructed of durable *galvanized steel.* Rust and weather proof. Proved effective, the choice of PCO's. Two sizes available for immediate delivery.

No. 1
26 guage, single compartment, 9" x 9" x 5½" high.

No. 2
24 guage, double compartment, (illustrated) 17" x 10" x 8" high.

Write for NEW LOW PRICES

Universal ELECTRIC PRODUCTS CORP
P.O. Box 3216 — 4200 So Mendota St.
Madison 4, Wisconsin

Whitmire Mosquito Adulticide

A mosquito insecticide, developed for the specific purpose of controlling adult mosquitoes, has been put on the market by Whitmire Research Laboratories.

Called CubeToid, the material can reportedly be used with the same kind of spray or fog equipment and methods of application as employed for other types of contact adulticides.

According to the manufacturer, CubeToid should be applied as either a spray or fog in a fine mist to contact as many mosquitoes as possible. Best results can reportedly be obtained by concentrating the spray or fog in locations where mosquitoes collect.

For further details, contact the firm at 339 South Vandeventer, St. Louis 10, Missouri.

Suppliers' Staff Changes

George V. Dupont is the new general manager of Diamond Black Leaf Co., Cleveland, O. He succeeds **John W. Kennedy** who has been appointed sales manager of agricultural chemicals for Diamond Alkali Co. Two new appointees to the Diamond Black Leaf sales staff are **James H. Hoskins**, who will work out of San Francisco, and **Oliver R. Eames**, who will be headquartered in Des Moines, Iowa.

Eward B. Lukas has been promoted to the position of technical service representative for the Velsicol Chemical Corp. He will work at Velsicol's general offices in Chicago.

Eastern Conference

(from page 48)

erally ineffective for control of German cockroaches resistant to chlordane.

• Factors Determining Insect Survival

In answer to the question "Are new buildings favorable for structural pests?" Dr. Harvey L. Sweetman, of the University of Massachusetts, told delegates insects have individual temperature, moisture and food requirements, of which the latter is most important in determining their survival in numbers. Insects are easily introduced into new buildings, where a relatively high degree of moisture is present for from one to three years after construction.

He emphasized studies had shown that there is a good possibility over 100 different pests enter homes each year. The primary problem is not one of how insects can get into new buildings, but rather the existance of conditions favorable for their survival once they have been introduced. Dr. Sweetman said fungi growing in new buildings provide a rich source of vitamin B_{12} complex, which is essential to rapid growth and reproduction.

Calendar

Professional Exterminators Assn. Monthly Meeting, Museum of Natural History, New York City, Mar. 12.

Duval County Pest Control Assn. Monthly Meeting, Peninsular Pest Control, Jacksonville, Fla., Mar. 13.

National Agricultural Chemicals Assn. Spring Meeting, Hollywood Beach Hotel, Hollywood, Fla., Mar. 14-18.

Pest Control Assn. of Western Pennsylvania Monthly Meeting, Fort Pitt Hotel, Pittsburgh, Mar. 15.

New York Pest Control Assn. Annual Dinner, Warwick Hotel, New York City, Mar. 16.

Washington Pest Control Assn. Monthly Meeting, 3054 M St., N.W. Washington, D. C., Mar. 19.

Alabama PCO Licensing Examinations, Birmingham, Decatur, Gadsen, Mobile, Montgomery, Mar. 20.

New Jersey Pest Control Assn. Monthly Meeting, Entomology Department, Rutgers University, New Brunswick, Mar. 21.

Michigan State PCO Short Course, Michigan State College, East Lansing, Mar. 22-23.

Texas Pest Control Assn. Quarterly Meeting, Stephen F. Austin Hotel, Austin, Mar. 24.

North Central States Branch, Entomological Society of America Meeting, Purdue University, Lafayette, Ind., Mar. 28-30.

Food Sanitation Conference, Syracuse University, Syracuse, N. Y., Apr. 16.

Nebraska Assn. of Pest and Termite Control Operators, Inc., Meeting, College of Agriculture, University of Nebraska, Omaha, Apr. 27.

California Assn. of Sanitarians 1956 State Wide Symposium, Lafayette Hotel, Long Beach, Apr. 27-28.

National Sanitary Supply Assn. 33rd Annual Convention and Trade Show, Conrad Hilton Hotel, Chicago, Apr. 29-May 2.

First International Pest Control Congress, Helmstedt, Germany, May 10-14.

Chemical Specialties Manufacturers Assn. 42nd Mid-Year Meeting, Drake Hotel, Chicago, Ill., May 20-22.

Tenth International Congress of Entomology, McGill University and the University of Montreal, Montreal, Canada, Aug. 17-25.

NEW, IMPROVED!

Cut cost! Save time!

3 GALLON STAINLESS STEEL SPRAYER

A 3 gallon stainless steel unit that is built for service! Economical and efficient in operation. CHECK THESE FEATURES: All mechanical seals — no soldered inlets — leakproof valve gauge with unbreakable crystal — stainless steel 3 gal. tank and pump. Renewable hose end adapters — 5 ft. PCE oil-resistant hose ¼" I.D. — 18" PCE extension wand — fan pattern spray nozzle — Knapsack type web strap. **$33.85**

All Prices F.O.B., Mount Vernon, N.Y. All Prices Subject to Change Without Notice. Write for Catalog.

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Records show, a steady increase in profits is now being enjoyed by PCO's who are currently using MOTH CHEK. New MOTH CHEK has been proven 100% effective by the National Institute of Dry Cleaners and the U. S. Testing Labs. Costs less, too!

- **New MOTH CHEK 5 year guaranteed mothproofer will not stain, is odorless, harmless, and easy to apply.**

FREE SELLING AIDS
- **Window Streamers**
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Sole Producers of:
- **Flame Chek**
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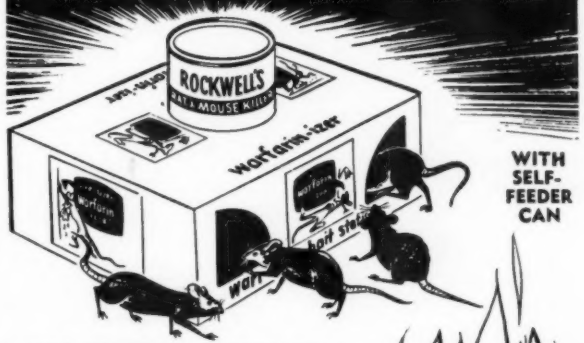
NEW ROCKWELL WARFARIN-IZER

DISPOSABLE BAIT STATION



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An entirely new approach to your rat and mouse control problem . . . a SELF-FEEDER that dispenses a constant flow of fresh bait . . . and a low-cost, DISPOSABLE bait station. No more cleaning messy permanent bait stations — no more dangerous scattering of bait. You simply place Rockwell's self-feeder can in the bait station which meets the sanitary requirements of food and processing plants.

To step up your rat and mouse control program . . . get Rockwell's combination rat and mouse self-feeder cans and disposable bait station now!

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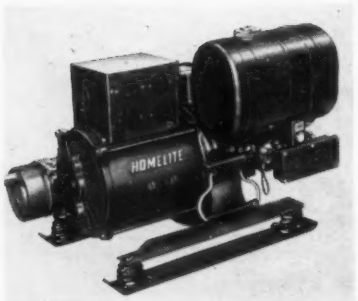


Homelite 1500 watt generator is said to operate all types of portable electrical tools and provide standby power in emergencies. Weighing only 90 pounds, the unit reportedly has four conveniently located outlets, so several tools can be operated simultaneously. Further details are available from Homelite Corporation, Port Chester, New York.

Diamond Takes Over Geigy Plant

Diamond Black Leaf Co., of Cleveland, Ohio, took over operation of Geigy Agricultural Chemicals' Des Moines, Iowa, pesticide processing plant recently.

Ownership announcement was made jointly by Loren P. Scoville, president of Diamond Black Leaf and Dr. George R. Ferguson, president of Geigy's Agricultural Chemicals Division.

Dr. Ferguson stated that this move was made primarily in the interest of intensifying Geigy's activities in the marketing of DDT and Methoxychlor and the further development and production of several new agricultural chemicals, including Diazinon.

Mr. Scoville said operation of the Des Moines plant gives Diamond its fifth formulating facility, the others being located at Richmond, Va.; Louisville, Ky.; Montgomery, Ala.; and Waco, Tex.

Floor Manual 2nd Edition

A second edition of the "Floor Maintenance Manual" has been published by Trade Press Publishing Co., 408 E. Michigan St., Milwaukee, Wis.

The book consists of 184 pages divided into 23 chapters and describes the nature of different types of popular floors and floor coverings, and their installation and care. It also includes formulae and instructions for removal of the more common stains and describes methods for making repairs to damaged floors.

Price of the book is $2.00 per single copy and $1.50 per copy when five or more manuals are ordered at one time.

37 Termite Repellents Tested

An evaluation of the toxic qualities of 37 chemicals as termite repellents is given in a report of government research released by the Office of Technical Services, U. S. Department of Commerce.

Field investigations were carried out in the jungles of Panama by the Naval Research Laboratory. Wood panels were impregnated with compounds of both known and unknown toxic qualities and exposed to attack by termites.

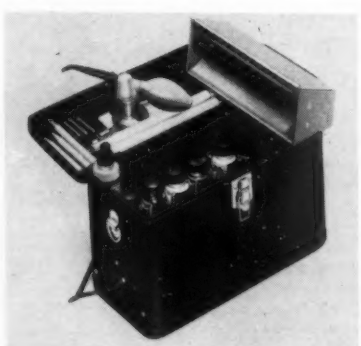
Of the compounds tested, pentachlorophenol, copper and zinc pentachlorophenate naphthenate, hexachlorophenol, zinc dithiocarbamate, creosote fortified with intermediate boiling fractions, creosote residue, creosote minus and tar acids and tar bases, and creosote minus the tar bases were most effective in repelling termite attack.

This report, PB 111737, "A Field Evaluation of Termite Repellents," is available from OTS, U. S. Department of Commerce, Washington 25, D. C., for 50c.

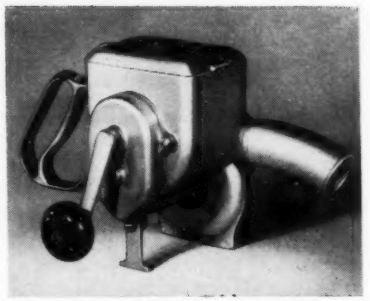
Shell Miss. Sales Office Moved

Shell Chemical Corporation's Agricultural Chemical Sales Division moved the office of its recently consolidated Delta-Houston district from Jackson, Miss., to New Orleans, La., last month. The central location of New Orleans was given as the reason for the move by F. W. Hatch, division manager.

Office address for the district is 119 South Clairborne, New Orleans 12.



A public health inspection kit, utilizing the qualities of black light and fluorescent materials to unmask contamination, is now on the market. Among the materials included in this unit are a black light lamp for use on both AC and DC, carrying case and batteries, invisible crayons, ink, paint, tracer paste, aerosol powder and dust gun, and mechanical pencil with invisible leads. The kit is being marketed by Black Light Corporation of America, San Gabriel, California.



Smith Pestmaster Garden Duster weighs only 1¼ pounds, but yet has enough capacity in one filling to treat 200 rose bushes, the company says. The unit reportedly throws an eight foot fine dust stream with one turn of the handle. Additional information on the duster can be obtained by writing D. B. Smith and Co., 414 Main Street, Utica, N.Y.

UCLA Insect Research Project

An experiment station research project on the biology and control of structural and household pests has been set up at the University of California at Los Angeles. Under the direction of entomolgist, Dr. Walter Ebeling, the program will principally be aimed at research on soil poisons for subterranean termite control, with particular emphasis on problems relating to dwellings with slab floors.

Major phase of the program at UCLA will be an evaluation of soil poisons which might be sprayed or poured on the soil prior to laying the slab. Other phases of the current project include studies of the use of infrared radiation to control powder-post beetles, and research on industrial decay problems.

Monsanto Building Program

Monsanto Chemical Co. will construct a group of general headquarters buildings on a 252-acre tract of land owned by the company in surburban St. Louis, Mo., it was announced recently.

Construction is expected to begin as soon as possible. It is anticipated that facilities will be ready for occupancy by late 1957. Plans call for three almost identical office buildings, an executive building, and a utility building. The three principal office buildings will each contain three floors. Approximately 300,000 sq. ft. of floor space will be provided.

Monsanto will also build a new laboratory at the firm's Creve Coeur, Mo., location to centralize research activities now performed in Ohio and Massachusetts.

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One pair of rats eat 27 pounds of food during six months. Each pair eliminate 25,000 droppings in six months, 1½ gallons of urine, and shed 1,000,000 hairs. This filth contaminates more food than the rats eat. Each pair of rats contaminate a bushel of grain daily!

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WITHOUT GAUGE **$24.50**

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Book Reviews

Mosquitoes

By. Dr. William R. Horsfall

This volume provides a complete summary of available information on the bionomics of the subfamily of mosquitoes. The combined results of research by sanitarians, epidemiologists, ecologists, physicologists, and other investigators are set forth systematically for easy reference by specialists in all branches of science.

The material in the 723-page tabulated text is arranged according to accepted taxonomic classifications. General information on the subfamily as a whole and on each genus precedes the more detailed treatment of particular species.

Containing 29 chapters, the book should be of immediate practical value to all who are actively concerned with the control of mosquitoes. It summarizes previous experience with control methods in infested areas in many parts of the world. It also gives the known facts about toxinosis in the egg, larva, pupa, and adult stages. In addition, details are provided on life habits of the various species on which new control methods may be based.

The author, who is as associate professor of entomology at the University of Illinois, Urbana, includes a discussion of the part played by each insect in the spread of malaria, yellow fever, and other diseases. There is a summary of examination results of the tissues of hundreds of species for evidence of pathogenic relationships.

Published in 1955, this volume is available for $16 from The Ronald Press Co., 15 East 26th St., New York 10, N. Y.

* * *

Mosquitoes of North America

By Stanley J. Carpenter and Walter J. LaCasse

A comprehensive work, culminating 18 years of intensive study and research on the taxonomy, biology, geographic distribution, and medical importance of North American mosquitoes, this text has been written for the technician, entomologist, public health officer, and field worker engaged in mosquito control.

Its contents include detailed descriptions of techniques for collecting mosquitoes for taxonomic studies and for evaluating problems both before and after the application of control measures. In addition, the 360-page volume contains several hundred illustrations including 127 full-page plates of adult mosquitoes.

The authors describe 142 species and subspecies of mosquitoes belonging to 11 genera, and provide keys to genera and species for adults and larvae. Under each species are given the original reference and synonymy, descriptions of the adult female, male and male terminalia, and larva. A separate section discusses the medical significance of those species known to transmit disease to man.

Published by the University of California Press, Berkeley 4, Cal., the volume sells for $10. It was published in 1955.

Texas City Licenses PCOs

All pest and termite control operators in Victoria, Texas, must now purchase a $25 license before they can operate within the city limits.

According to a city ordinance, which went into effect February 1, applicants for the license must also be screened by a three man board composed of the Fire Marshal, Fire Chief, and PCO Fred Reed, of the Oliver Goldsmith Co.

CDC Report

(from page 28)

be used in residences and food-handling establishments.

● Sodium Monofluoroacetate (1080)

Sodium monofluoroacetate (1080) is still the most effective, fast-acting rodenticide, but its extreme toxicity to man and animals requires that it be used only on certain types of premises and only by carefully trained crews. The precautions necessary for the safe use of 1080 are numerous and involved. They are described in "Operational Memoranda on 1080" issued by the Communicable Disease Center.

● Baiting Problems

In tests in Savannah, Georgia, corn meal has proved to be the most readily accepted cheap bait. In general, any available cereal may be used as bait material. It is worthwhile to restate that under certain conditions it is very difficult to get rodents to take any bait, e. g., where food is available in great variety and abundance, as in some warehouses. Such conditions constitute baiting problems, a term which implies that the origin of the difficulty lies not in the particular poison used but in the ecology of the rodents themselves. Obviously, in testing any given rodenticide formulation, it is necessary to be certain that apparent failure of the formulation is not caused by baiting problems. These problems can be solved effectively only through extensive knowledge of the habits of the rodents. Such problems do not occur more frequently when simple cereal baits such as corn meal are used than when complex bait mixtures are used.

Notebook

TIPS AND IDEAS FROM THE FIELD

Unusual Invaders

By Professor J. J. Davis

It seems more and more reports are coming in regarding insects of no economic importance indoors that are occurring in homes and are becoming annoying. This may mean more business for the PCO.

We are all familiar with such insects and other arthropods as longhorned beetles carried in on fireplace logs, hackberry psyllids coming in through the screens in the fall, houseflies, vinegar gnats, mosquitoes, thousand legged worms, sowbugs, slugs, elm leaf beetles, oats bugs, boxelder bugs, bird mites, and many others.

Last summer we heard of a couple of new ones. In one case the house was literally filled with cutworm moths. The moths were very abundant during the last half of June because cutworms had been exceedingly abundant and destructive in May and early June and were just changing to adults. How they got into homes in such numbers we do not know.

Another unusual insect in homes is the click or snapping beetle, adult of the wireworm. We have had three reports of abundance in homes. In one case they were present in a home that had been vacant for several years. In this instance the beetles apparently entered the house for protection in the fall. A family had just moved in, but when the beetles came out at night and were so annoying, the family got up at 2:00 a.m. and moved out.

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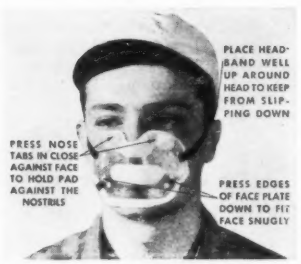
PLACE HEADBAND WELL UP AROUND HEAD TO KEEP FROM SLIPPING DOWN
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Article Explains Miller Bill

PCOs desiring more data on the Miller Pesticides Bill will want to obtain a copy of an article prepared by Professor J. J. Davis, of Purdue University.

Entitled "Progress in Pest Control and the Meaning of the Miller Amendment to the Food and Drug Act" the article not only interprets the legislation and its implications, but gives background information as well.

Copies of this article are available from Professor Davis at Department of Entomology, Purdue University, West Lafayette, Ind.

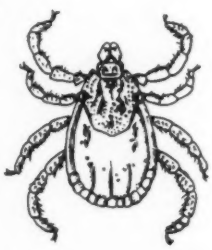
Primer

LOOK LIKES: 15

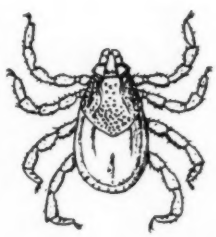
Prepared by DR. MARION E. SMITH and HSIU-FU CHAO
Entomology Department, University of Massachusetts, Amherst

American Dog Tick and Brown Dog Tick

Insects that look alike are often commonly mistaken for one another. These columns are designed to point out physical characteristics of insects that closely resemble another species so rapid and accurate identification can be made. In this installment the authors illustrate distinguishing features of the American dog tick and brown dog tick. Last month the bed bug, batbug and chimney swift bug were taken up. Keep these columns on hand in your entomological library for future reference.



AMERICAN DOG TICK
Dermacentor variabilis



BROWN DOG TICK
Rhipicephalus sanguineus

Size

Before feeding - about ¼ inch long.
After feeding - ½ inch.

Before feeding - about ⅛ inch long.
After feeding - 1/3 inch.

Color

Dark brown, shield mottled with white.

Uniform gray or brown, no white mottlings.

Hosts

Rodents and rabbits when immature; when mature, dogs, man, and large animals; readily attacks man.

Domestic pest of dogs; not found on wild animals; very rarely bites man.

Habitat

An outdoor tick, picked up in grass, brush, debris.

An indoor tick not found in the woods in the Northeast; found in buildings and kennels frequented by dogs. Hides in cracks and crevicies to lay eggs.

Infestation Report

Contains pertinent portions of the Department of Agriculture's **Cooperative Economic Insect Report**, material from university entomology departments, and **reports** from readers. PCOs noticing infestations in their own areas are urged to communicate with **Pest Control** so their information may be added to this infestation report.

A GRAIN BEETLE
(Aphanotus destructor)

California: Found in flour at National City, San Diego County, recently. Second report for California.

AN OTITID
(Chrysomyza demandata)

Oklahoma: Larvae being reported from trench silos in many sections of the state. Thousands of flies have emerged from a cubic foot of silage.

BLACK-LEGGED TICK
(Ixodes scapularis)

Arkansas: Females and partially engorged males on dogs in south central area.

BROWN-BANDED ROACH

Massachusetts: Four houses in different sections of Plymouth County found infested recently.

BROWN DOG TICK
(Rhipicephalus sanquineus)

Delaware: Annoying in a home in Newark. **Massachusetts:** House infested in Newton. **Maryland:** Adults in home in Bethesda.

CIGARETTE BEETLE
(Lasioderma serricorne)

Florida: Larvae recently averaging 42 per 20-pound bag of tobacco seed at Quincy, Gadsden County.

CLOVER MITE
(Bryobia praetiosa)

North Carolina: Invading homes in Davidson, Alamance and Wake Counties.

HOUSE FLIES

Arizona: Fly population indices of two small towns in Maricopa and Pinal Counties: Average of five highest grill counts in nine blocks recently was 31.4.

KHAPRA BEETLE
(Trogoderma granarium)

California: Light infestation in a warehouse and milling refuse recently in Napa County. First record for county.

OLD HOUSE BORER
(Hylotrupes bajulus)

North Carolina: Reports of this pest are increasing.

PAVEMENT ANT
(Tetramorium caespitum)

Delaware: Annoying in office building utility room at Dover recently.

PECAN WEEVIL
(Curculio caryae)

North Carolina: Infestation of 20% in a lot of stored nuts in Mecklenburg County and another in Rutherford County.

PRAYING MANTIS

Massachusetts: Infestation recently developed in a Boston department store from black alder twigs which had been sprayed with silver paint. Egg clusters were found on some of the twigs.

STORED GRAIN INSECTS

Arkansas: Twelve bins of 98 rice and oat bins examined in the Stuttgart-Dewitt area in December were infested with one or more species of insects.

SAW-TOOTHED GRAIN BEETLE
(Oryzaphilus surinamensis)

Utah: Heavily infesting a large granary at Manti. **Maryland:** Adults and larvae infesting chocolate in Baltimore.

Haun Joins Baltimore PCO

Dr. Joseph R. Haun has accepted a position as director for the newly established weed control division of Insect Control and Research, Inc., Baltimore, Md. He was formerly plant physiologist for weed control research with the Grasselli Chemicals Department of E. I. duPont de Nemours & Co., Wilmington, Del.

The new division of Insect Control and Research will conduct custom research projects on the adaptation of chemicals or biproducts for herbicidal uses and will offer service and consultation on weed control problems for industry and government. Particular attention will be paid to weed control problems in Latin America where ICR will expand its consulting service to oil and mining companies as well as road building and maintenance agencies.

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100 LB. DRUMS	1.55 LB.
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When answering ads where box number only is given, please address as follows: Box number, c/o Pest Control, 1900 Euclid Avenue, Cleveland 15, Ohio.

Rates: "Position Wanted" 5c per word, minimum, $1.00. All other classifications, 10c per word, minimum $2.00. All classified ads must be received by Publisher at least three weeks preceding publication date and be accompanied by cash or money order covering full payment.

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TERRITORY MANAGERS. Salesmanship and desire for self advancement only requirement. No capital necessary. No age limit. Truck, equipment, state license, contractors liability, workmen's compensation, bonds and advertising paid by company. Managers 70% gross, company 30% gross. If interested contact Home Office, Darbe Termite Control, Box 45, Fredonia, Kansas.

WORLD'S LARGEST pest control firm, operating in 28 states from coast to coast, needs several high-caliber men for responsible positions. Must have initiative, good judgment, the ability to work and deal with people, and should be personally ambitious. Experience in professions related to pest control helpful. Liberal salary and incentive arrangements provide excellent opportunities with progressive and well established firm. Employee benefits include paid vacations, sick leave, life insurance, hospitalization and pension plan. Training programs for our future managers and other supervisory positions also open to college graduates. All replies confidential. Contact Technical Department, Orkin Exterminating Company, Inc., 713 W. Peachtree Street, N.E., Atlanta, Georgia.

GRADUATE ENTOMOLOGIST to work for greater Miami's largest pest control firm. Recent graduate preferred. Salary commensurate with ability. Address all replies to Truly Nolen, President, Truly Nolen Exterminators, 600 N.W. 7th Ave., Miami, Fla.

MANAGER NEEDED for growing well established pest control firm in New York Metropolitan Area. Experience in pest control or correlated fields helpful, not essential. Must possess executive ability, initiative, salesmanship. Tremendous future potential for individual willing to assume responsibility. Leadership essential. All replies confidential. Write full summary of background. Box 404 Pest Control magazine.

HORTICULTURIST for work with Miami's largest pest control firm. Recent graduate preferred. Salary commensurate with ability. Address all replies to Truly Nolen, President, Truly Nolen Exterminators, 500 N.W. 7th Ave., Miami, Fla.

GRADUATE ENTOMOLOGIST who could be certified in Florida, to go to work immediately. State salary wanted. Box 402 Pest Control magazine.

POSITION WANTED

LICENSED pest control man wishes to represent manufacturers of pest control equipment and chemicals for sales to PCOs, general and termite, and also large industrial and farm users. Can cover 11 western states and warehousing facilities available. P. A. Miller, 7918½ Blackburn Ave., Los Angeles 48, Calif.

ENTOMOLOGIST, M.Sc. desires connection with pest control overseas operation. Will pioneer. Several years experience as owner, serviceman, salesman. Box 401 Pest Control magazine.

WANT TO BUY

PEST CONTROL BUSINESS with termite and sanitary sales optional. Pest control accounts must net $8,000 or more annually. Partnership or complete purchase by sales and technically qualified party. Box 397 Pest Control magazine.

INDIVIDUAL will pay cash for pest control route or small business in Winston-Salem, Greensboro, or High Point, N. C. or vicinity. Box 400 Pest Control magazine.

SMALL PEST CONTROL or termite business in Florida. Send full particulars to Box 403 Pest Control magazine.

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Paper Mache and Composition, Highly Colored and Very Realistic

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Soldier	14 Inches	$4.50
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Male Adult	11½ "	6.00
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B & G Co. 27, 31
John Bean Division 33
Broadway Rubber Co. 6
Chapman Chemical Co. 39
Charleston Rubber Co. 70
Chek Chemical Prod. Co. 61
Cincinnati Tool Co. 50
Wm. Cooper & Nephews, Inc. 16
Curtis Automotive Devices 57
Dow Chemical Co. 7
E. I. duPont de Nemours & Co. 3
Ewing Manufacturing Co. 53
Fairfield Chemical Division third cover
Geigy Chemical Co. 29
Getz Exterminators, Inc. 69
Hardie Manufacturing Co. 20
Hopkins Agri. Chem. Co. 63
H. D. Hudson Mfg. Co. 57
Hypro Engineering, Inc. 49
Idico Products Co. 65
Insect Model Co. 68
Mar-Mel Products Co. 56
Martindale Electric Co. 66
McLaughlin Gormley King Co. 49, 67
Michigan Chemical Co. 25
Minx Products 50
Motomco, Inc. 18
Orb Industries, Inc. 65
Orkin Exterminating Co. 65
S. B. Penick & Co. 21
Per-Mo Products Co. 66
Pest Control Chemical Co. 65
Pest Control Equipment Co. 61, 63, 69, 4th cover
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Pyrrole Chemical Co. 13
Rockwell Laboratories 61
Shell Chemical Co. 4
D. B. Smith & Co. 69
Spraying Systems Co. 53
Syntron Co., Inc. 52
Tanglefoot Co. 60
Todd Shipyards Corp. 28
Universal Electric Products Co. 60, 63
Universal Paper Prod. Co. 6
Vaccinol Chemical Co. 53
Velsicol Chem. Corp. 2nd cover
B. & D. A. Weisburger 63
Whitmire Research Lab. 55
Wis. Alumni Res. Fdn. 11
Wood Treating Chem. Co. 44

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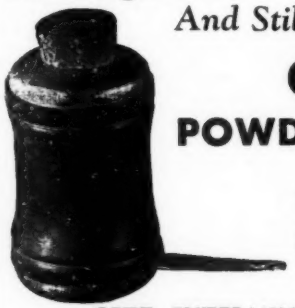

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Pestales

Two for the Money. PCO L. S. "Bugs" Bridges, Baton Rouge, La., treasurer of the annual Southern PCO conference, became a proud grandpapa on the eve of this year's meeting when his daughter gave birth to twin baby girls. To show appreciation to "Bugs" for his untiring work in behalf of the conference, conferees chipped in $30 to buy flowers for the new mama.

* * * *

In the Running. Claude M. Snow, operator of Snow Insecticide Co. in Portland, Oregon, and 6-year MC at Northwest PCO conferences, is a candidate for the Republican nomination for U. S. representative from Multnomah county. The 60-year old PCO, born in Leicester, England, began his pest control business in 1932.

* * * *

Cheesecake Control: *From now on when the Philippine Islands rat population hears there's going to be a beauty contest they'll head into their "bomb shelters" for the duration. It seems the Philippine Department of Agriculture recently sponsored a contest to pick the most beautiful girl on the island of Panay. It all sounds innocent enough up to now, but here's the catch. The department stipulated that votes for the beauty queen be cast in rat tails. There must have been a lot of pretty girls in the contest because more than 37,000 rat tails were turned in.*

* * * *

New Species. Ralph Hamilton, Mt. Vernon, Ohio, branch manager for Central Service & Exterminating Co., announced in February discovery of "an unusual specimen with reddish coloration, four limbs, dark hair on anterior portion of the head and non-committal expression. Weight is 7 lbs., 8 ozs. He, and wife Dawn, have labeled it David Barr, species Hamilton.

And speaking of newcomers, chalk up another, their fifth, for the Robert Schendels of Topeka, Kansas. Pop runs Schendel Pest Control there. Newest addition is their first boy, Robert Treat.

Up in Canada, PCO grandpa, Harold Corbett of St. Thomas, Ontario, is boasting about his new grandson, Edward Harold, born to his son and daughter-in-law, the Mr. and Mrs. Kenneth Corbetts.

* * * *

Court Capers: *A New England murder trial was temporarily interrupted recently by the antics of a playful bat who swooped down on witnesses, scattered the jury and upset judicial dignity. All efforts to entice the pesky creature from the courtroom failed. Finally tiring of this unseemly conduct, the judge took matters in hand, and with the help of a timely wielded broom, drove the invader outside. Next case!*

* * * *

Coincidence. Walter O. Blank, who runs Abalene Pest Control in New York City and is overseas chairman for the First International Pest Control Congress, noted that Herr O. Buettner is in charge of the program to be held in Helmstedt, Germany. No relation, Walter says, to the William O. Buettner who founded the NPCA 23 years ago.

* * * *

One of the proudest recipients of a 10-year attendance certificate at this year's Purdue PCO conference was Sam "No Roost" Grossman of Aegis Laboratories in Chicago. When Professor J. J. Davis handed him the "sheepskin" Sam almost held it high for everyone to see and smiled with a big grin that said, "I made it, I made it!"

* * * *

Mousecapades: *Mice can even make strong men quake. Two mice that made a sneak raid up the pant leg of a 200-pound railroader forced him to disrobe down to underwear and shoes in a frantic effort to get rid of the unwelcomed intruders. Incident occurred in the waiting room of a Canadian railway station. Luckily, no "mice-timid" females were present.*

* * * *

Away Down South In Dixie. Hoping to get away from that cold weather up North for a little time, Mrs. Bertha Burgess and Frank Birch, of Birch Fumigation, Edmonton, Alberta, Canada, came clear down to Baton Rouge, La., to attend this year's Southern PCO conference. It was the first time either had been that far South and they couldn't get over the warm weather in January.

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